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Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

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Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE 404
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION 404
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) N.A.

89 ASTRONOMY 405
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS 406
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION 406
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS 407
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION 408
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

99 GENERAL N.A.

Note: N.A. means that no abstracts were assigned to this category for this issue.

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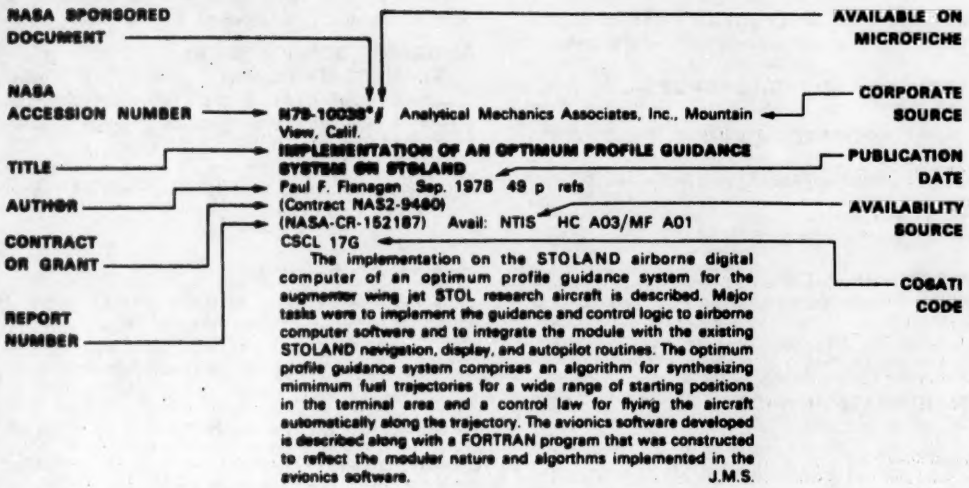
TYPICAL CITATION AND ABSTRACT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N79-10038*# Analytical Mechanics Associates, Inc., Mountain View, Calif.
CORPORATE SOURCE
TITLE
IMPLEMENTATION OF AN OPTIMUM PROFILE GUIDANCE SYSTEM ON STOLAND
PUBLICATION DATE
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The implementation on the STOLAND airborne digital computer of an optimum profile guidance system for the augmentor wing jet STOL research aircraft is described. Major tasks were to implement the guidance and control logic to airborne computer software and to integrate the module with the existing STOLAND navigation, display, and autopilot routines. The optimum profile guidance system comprises an algorithm for synthesizing mimimum fuel trajectories for a wide range of starting positions in the terminal area and a control law for flying the aircraft automatically along the trajectory. The avionics software developed is described along with a FORTRAN program that was constructed to reflect the moduler nature and algorithms implemented in the avionics software.
J.M.S.

ON-GOING RESEARCH PROJECTS

This is a listing of research projects— not publications

AERONAUTICS

Includes Aeronautics (general); Aerodynamics; Air Transportation and Safety; Aircraft Communications and Navigation; Aircraft Design, Testing, and Performance; Aircraft Instrumentation; Aircraft Propulsion and Power; Aircraft Stability and Control; and Research and Support Facilities (air). For Related Information See Also Astronautics.

1.0001, IMPROVED SYSTEMS FOR POSITIONING AND RESTRAINT FOR EJECTION SEATS
N. BICE, Pacific Scientific Company, *Anaheim, California* 92803 (DN881138; N62269-77-R-0122)

Investigate and develop systems and/or devices to provide improved restraint and pre-positioning for proper body positioning during ejection. This contract supports work unit ZA601, Agency Accession No. DN681080.

A contract has been let to Pacific Scientific Corp. for the design and manufacture of prototype hardware for lower lap belt thrusters, head and neck restraint actuation and separation cutter as an integrated system, developed primarily for the MPES.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

1.0002, DEVELOPMENT OF SOLID CHEMICAL EMERGENCY OXYGEN SYSTEM
W. SIEBER, Amer. Safety Flight Syst. Inc., *1311 Grand Central Ave., Glendale, California* 91201 (DN781274; N62269-73-C-0735)

To develop a solid chemical emergency oxygen system for installation in the RSSK-8A used in naval aircraft. This kit will provide ready transport and will be usable after extended storage. This contract supports work unit ZA601, Agency Accession No. DN681080.

An elliptically shaped candle subsystem was developed for the RSSK-8A. This kit was chosen because it has the smallest available space for an oxygen system. This oxygen system can therefore be readily adapted for all other seat kits.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

1.0003, DEVELOPMENT OF NAVY V/STOL FLYING QUALITIES DESIGN CRITERIA
R. HOH, Systems Technology Inc., *13766 S. Hawthorne Blvd., Hawthorne, California* 90250 (DN881370; N62269-77-C-0038)

To identify, in priority order, specific areas in need of improvement in MIL F 83300 and to develop recommended new or revised criteria in selected areas.

The contractor will perform an investigative engineering analysis resulting in recommended V/STOL flying qualities criteria applicable to proposed Navy V/STOL sea-based aircraft. The analysis will include: a. review of operational requirements; b. Prioritization of deficiencies; c. Investigation of alternate/new criteria; and d. Recommendations for additional criteria verification.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

1.0004, AIR-TO-GROUND COCKPIT DESIGN
F. DRSATA, Rockwell International Corp., *International Airport, Los Angeles, California* 90009 (DF140000; F33615-77-C-3070)

This work unit supports AFSC Development Goal TW6. Advances in sensor technology and on-board computation capability could exceed the systems management capability of aircraft flight crews using existing control/display techniques. The objective of this work unit is to evolve guidelines for fighter aircraft crew stations designed to perform the air-to-ground weapon delivery task. Identification will be made of potential areas for subsystem integration that would relieve excessive crew workload and, at the same time, enhance mission effectiveness of the total weapon system. One specific objective is to provide cost trade-off data to help resolve the issue of crew size vs. mission capability.

Mission, threat, and functional systems analyses will be performed for candidate air-to-ground aircraft. Required mission performance characteristics will be assembled into a detailed mission scenario and specific system task requirements will be identified. Detailed crew task time-lines will be developed. A crew station mock-up will be constructed based on a design incorporating advances in weapon technologies, control and displays and optimized anthropometrically. Pilots from operational/user commands will evaluate the mock-up in a structured mission environment. Evaluation results will provide initial data on the appropriateness of the instrument configuration, crew procedures/checklists, and the trade-offs between crew size and avionics sophistication. Follow-on mock-up iterations and/or part task simulations will be used to assess developed guidelines.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0005, AIR DATA STUDY (CTOL)
P. GASTON, Signal Companies Incorporated, Air Research Manfacturing Co, *2525 W. 190th St., Torrance, California* 90509 (DN781390; N62269-77-C-0044)

To develop a solid-state air data system for CTOL (conventional takeoff and landing) aircraft. This contract supports work unit ZA601, Agency Accession No. DN681080.

Determine requirements for future air data systems by performing studies and surveying airframe and using activities. Determine the optimum approach for the design of a solid-state air data system to meet future CTOL aircraft requirements. Prepare a developmental specification.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

1.0006, COMPLIANT ROTOR MISSION ANALYSIS
R.H. BLACKWELL, United Technologies Corp., Sikorsky Aircraft Division, *N. Main St., Stratford, Connecticut* 06602 (DA0E3775; DAAJ02-77-C-0041)

To determine the mission effectiveness of a compliant rotor when compared with a conventional rotor. The compliant rotor is a rotor in which the aeroelastic properties are deliberately designed so that the inherent dynamics response of the rotor system will result in improved rotor operational qualities.

A series of missions will be selected for a mission effectiveness study on a helicopter with a compliant rotor. A base line conventional rotor (UH-60A) will be used in conjunction with a compliant rotor to determine the benefits to be derived from compliant rotor technology.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Air Mobility Research & Development Lab.

1.0007, INVESTIGATION TO CORRECT THE HIGH-TEMPERATURE PROBLEMS AND DEVELOPMENT OF ELECTROSTATIC FIELD SENSOR FOR HELOS P-STATIC DISCHARGER

G. PARKINSON, United Technologies Corp., Sikorsky Aircraft Corp Div, *N. Main St., Stratford, Connecticut* 06602 (DN790080; N00019-77-C-0255)

To develop a no-moving-parts electrostatic field sensor to drive CH53 p-static discharger system and to correct the temperature problem in its bleed air system components.

A p-static discharger system was developed for helicopters of the CH53E fleet but the system sensor and bleed air components have not been effective. Contractor shall develop and laboratory test two prototype sensors and two manifold (discharge channels). Using CH53E operating requirements a computer analysis will be made to determine sensor design parameters. Two solid-state sensors with dual probes and two new hi-temperature channels using the best insulating macor (glass) materials or equivalent will be built. Both sets of sensors and channels/manifold components will be tested in the laboratory using signals from the p-static discharger system.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

1.0008, ADVANCED COMPOSITES DESIGN PROGRAM

R.B. PIPES, Univ. of Delaware, School of Engineering, Mech & Aerospace Eng, *Newark, Delaware* 19711 (DF140900; F33615-77-C-3132)

Advanced composite structures offer the potential of saving weight and cost on future military airframe structures and will allow significant increases in aircraft performance (particularly range). The amount of payoff in weight and cost to be realized will depend on the efficiency of the design concepts used. One concept proposed by AFFDL/FB has outstanding promise for a tremendous payoff, but needs development before it can be introduced into production aircraft. This program will develop essential design information on this concept, which features spar caps embedded in composite wing skins.

This effort will investigate promising new concepts for attaching spars to skins in advanced composite wing structures. An existing fighter aircraft will be used as base line, and the new concepts will be developed to meet the specific requirements of this base line. Activities to be conducted include preliminary design, detailed design, component fabrication, and testing of the components. A final report will be published.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0009, INSTRUCTIONAL SYSTEMS DEVELOPMENT

J.F. FUNARO, U.S. Navy, Human Factors Laboratory, *Orlando, Florida* 32813 (DN694005)

(1) Production of a comprehensive ISD document which incorporates detailed management and technical procedures and which can actually serve as an instructional design guide (in the form of job-performance aids) within the Navy. (2) Development of a set of personnel, time and cost factors which can be used in evaluating ISD or in detailed planning for ISD projects. (3) Accumulation of a body of data which supports or refutes the desirability of routinely employing the ISD approach in response to instructional design and development problems.

Maximum utilization will be made of 'lessons learned' from Project 5753. A thorough review will be made of all known applications of the ISD approach to aircrew and maintenance training in aviation systems. The review will document the management, technical and econometric procedures employed as well as measures of cost-effectiveness realized. The Navy aircraft weapon system development cycle will be reviewed in order to determine the utility of presently required documentation to ISD as well as to establish milestones and constraints for the application of ISD. A guideline for the implementation of the ISD approach in the development cycle of naval aircraft systems will be developed. Specifications, DID's and other documentation needed to define required contractor and in-house activities will be prepared. The approach developed will be compatible with present system development policies and will be coordinated with other personnel-oriented disciplines such as human factors engineering. In addition, methodologies and procedures for assessing and validating the effectiveness of ISD programs will be developed.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Training Equipment Center

1.0010, LOW-COST COMPOSITE RPV WING

J.J. GROSKO, Lockheed Georgia Company, *86 S. Cobb Dr., Marietta, Georgia* 30060 (DF138160; F33657-76-C-0713)

Remotely piloted vehicles (RPV's) are making an increasingly important contribution to our aerospace power. Reducing the acquisition cost of these aircraft is as important as reducing the acquisition cost of larger manned aircraft. The use of advanced composites combined with elastomeric tooling, which does not require an autoclave, holds great promise of reducing the acquisition cost of aircraft structures. Purpose of the program is to demonstrate the cost savings inherent in graphite/epoxy structures built with elastomeric tooling. Data and procedures developed under this program will be directly applicable to all structures using fibrous epoxy construction. Qualification of this fabrication technique will result in substantial cost savings for all fibrous epoxy structures as well as an estimated 35 percent cost savings on the RPV wing.

A graphite/epoxy wing will be designed and fabricated using elastomeric tooling. It will undergo static load testing and ground vibration testing, and then be flight-tested on a BGM-34C test vehicle. Quantitative measurements of flight loads and structural deflections will be made. The design and fabrication of the wing will be contracted. The integration and flight-testing will be performed by AFFDL personnel.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0011, DEVELOPMENT OF A COMPREHENSIVE NDE (NON-DESTRUCTIVE EVALUATION) EXPLORATORY AND ADVANCED RESEARCH PROGRAM FOR NAVAL AIRCRAFT SYSTEMS

R. CAHALL, U.S. Navy, Air Engineering Center, *Lakehurst Naval Air Station, Lakehurst, New Jersey* 08733 (DN696012)

To develop a comprehensive program of exploratory (6.2) and advanced (6.3) development for NDE (non-destructive evaluation) of naval aircraft systems.

A review and analysis of the following area will be undertaken to identify high pay-off sectors to which follow-on exploratory and advanced development programs will be addressed. (1) NDE (non-destructive evaluation) technologies, new and/or advanced shall include but not be limited to: liquid penetrators, ultrasonics, x and n radiography, eddy current, thermal and infrared testing, microwave, magnetics, acoustic emission, holography krypton exposure and oil and fluid analysis. (2) Application and utilization areas; both present and potential. Review of (a) current inspection criteria, (b) scheduled and unscheduled maintenance actions which could be minimized given an adequate NDE technique and (c) fleet feedback concerning current and projected operational NDE requirements. (3) Future requirements, based on aerospace technology projections. (New materials and fabrication techniques.)

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

1.0012, COMPRESSIBLE SUBCRITICAL AIRFOIL DESIGN AND TEST

G.M. GREGOREK, Ohio State University, School of Engineering, Aeronautical & Astronaut Engin, *190 N. Oval Dr., 102 Administration Bldg., Columbus, Ohio* 43212 (DF141270; AFAFOSR-3476-78)

This work unit supports the development of advanced USAF high-altitude, long-endurance aircraft. Presently, high-altitude,

long-endurance aircraft used for military missions are limited in altitude and payload capability. Advanced technology airfoils will help alleviate these lifting surface associated problems. This work effort is the design and wind tunnel test of compressible subcritical airfoils for future USAF aircraft, using a previously developed airfoil methodology. Use of these advanced technology airfoils will permit flight envelope expansion on future military high-altitude, long-endurance air vehicles.

A compressible inverse airfoil design procedure developed for AFFDL/FXM will be used to configure several high-performance airfoils for high-altitude, long-endurance aircraft applications. The most promising of these designs will be tested two-dimensionally in the Ohio State University transonic wind tunnel facility.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0013, SIMULATION VERIFICATION

W.W. HARRINGTON, U.S. Air Force, Flight Dynamics Lab., *Wright Patt. A.F.B., Dayton, Ohio* 45433 (DF141680)

This work unit supports the development and maintenance of analysis capabilities, engineering simulation capabilities, and experimental testing methods for flight/man-machine system evaluation. It is directed toward the development of basic simulation technology as required by manned engineering flight simulation for fighter aircraft development. Specific objectives include: 1) verification of a specific aircraft model, including airframe stability and thrust vs drag, 2) verification of the real-time simulation of this aircraft model, 3) development of parameter identification techniques as a verification tool, 4) development of data reduction techniques and software for the evaluation of the utility and adequacy of simulator cues for the air-to-air combat environment, and 5) evaluation of the adequacy of simulator cues as provided by the large amplitude multimode aerospace research simulator (LAMARS) at the AFFDL for the air-to-air combat environment. The adequacy of simulator cues for the air-to-air combat environment as provided by the dual flight simulator (DFS) in the Federal Republic of Germany will also be evaluated. This analysis will contribute to the technology required for the appropriate development, adaptation, and integration of simulation equipment in support of AFFDL manned engineering flight simulation programs.

Flight test and simulation data will be obtained from a flight-test/simulation program containing five interrelated phases including vehicle performance testing, conventional stability testing, parameter identification testing, handling qualities during tracking testing, and terminary air-to-air gunnery testing with an LCOSS sight. Both subjective and quantitative data will be evaluated. The data reduction techniques and software will be developed as part of this effort. The analysis will be applied to data from the LAMARS and also to data from the DFS which will be provided under MWDDEA AF 75 G 7430.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0014, BASIC RESEARCH IN STRUCTURES AND DYNAMICS

J.J. OLSEN, U.S. Air Force, Flight Dynamics Lab., *Wright Patt. A.F.B., Dayton, Ohio* 45433 (DF141950)

This work unit supports the technical base functions of the structural mechanics division of the Air Force Flight Dynamics Laboratory. It addresses the problem areas of transonic unsteady aerodynamics, flutter, aeroelastic optimization and integration of aeroelastic disciplines. The goal is to create a numerical, analytical and experimental array of techniques to integrate the aeroelastic design, analysis and testing of aircraft structures to reduce the cost of design, acquisition and operation of new aircraft. This work unit will obtain substantial improvements in our ability to design, analyze and optimize aircraft structures for unsteady aerodynamic forces, vibrations, flutter, loads and aeroelastic control system interactions.

Initial developments will include the development of a three-dimensional transonic unsteady aerodynamic computer program for flutter applications. Finite-element structural programs will also be modified to automate the input of data and the presentation of results.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0015, THE KRYPTON EXPOSURE TECHNIQUE (KET)

A. MAHON, Qual X Incorporated, *4065 N. Leap Rd., Hilliard, Ohio* 43026 (DN789758; N00019-76-C-1142)

To KET inspect engine hardware and test materials supplied by the Naval Air Propulsion Test Center and the Naval Air Systems Command (AIR-330A).

To develop KET standards and specification and trouble-shoot service problems apply KET to key components.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Propulsion Test Center

1.0016, INVESTIGATION OF THE CRASH IMPACT CHARACTERISTICS OF ADVANCED AIRFRAME STRUCTURES

J. CRONKHITE, Bell Helicopter Company, *P.O. Box 482, Fort Worth, Texas* 76101 (DA0E3789; DAAJ02-77-C-0062)

To determine (1) The ability of advanced airframe structural materials to withstand crash impact loading, (2) The effect of these materials on impact structural integrity and impact force attenuation, and (3) Technological barriers to advanced airframe structures withstanding impact loads.

Design concepts for MIL-STD-1290 'Airframe Structures Constructed from Composite Materials' will be designed, analyzed and tested. Analytical and test results will be evaluated to ascertain structural integrity and crash impact energy absorption.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Research & Technology Lab.

1.0017, HT RM 78-16 - ASSESSMENT OF TURBOSHAFT ENGINE R AND M FEATURES

UNKNOWN, U.S. Army, Applied Technology Laboratory, *Fort Eustis, Newport News, Virginia* 23604 (DA0E3826)

The objective of this effort is to assess what reliability (R) and maintainability (M) features could be incorporated in small turboshaft engines consistent with the M environment envisioned for future Army aircraft. This program would identify specific R and M features that could be used on small turboshaft engines.

This program would include an assessment via a house task of what the M environment of turboshaft engines will be, a definition of typical future engine requirements - i.e., potential future aircraft applications - a definition of what M demonstration requirements for engines, how best to conduct R and M programs for engine development efforts, develop R and M features that can be incorporated in turboshaft engines and define module and line replaceable unit selection, servicing, cleaning, and diagnostics philosophy and/or requirements.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Research & Technology Lab.

1.0018, HT RM 78-02 - DESIGN & FABRICATION OF EXPERIMENTAL TEST HARDWARE - EXTERNAL CARGO OPERATIONS

J.A. VICHNESS, U.S. Army, Applied Technology Laboratory, *Fort Eustis, Newport News, Virginia* 23604 (DA0E3808)

To improve the capabilities of helicopters in performing external cargo operations in tactical and logistical support missions.

Utilizing a contract-support house task, design analyses of contractor and in-house identified technologies will be conducted in relation to overall aircraft systems and current/future combat support concepts. In-house efforts will utilize the facilities of the ATL, structures (wind tunnel), and aero laboratories and experimental flight hardware for verification of selected technology concepts and to identify technology voids.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Research & Technology Lab.

1.0019, AIRCRAFT INSTALLATION OF MULTIPLEXING HARDWARE
W. FIELDS, Boeing Company, Aerospace System Division, *7555 E. Marginal Way South, Seattle, Washington* 98108 (DN781192; N62269-76-C-0170)

Obtain transmission system data relative to the operation of GPMS-X terminals when operating with 'live' aircraft system(s) signals. This contract supports work unit ZC201, Agency Accession No. DN 681082.

Install and operate the NavAirDevCen GPMS-X equipment within the Boeing 720 test-bed vehicle. Information pertaining to signal capacity transport delay and will be recorded and analyzed.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

1.0020, CREW ESCAPE CONCEPTS FOR ADVANCED HIGH-PERFORMANCE AIRCRAFT
D.E. SWANSON, Boeing Company, *7555 E. Marginal Way South, Seattle, Washington* 98108 (DF140430; F33615-77-C-2056)

Operational experience with emergency crew escape systems in the USAF has yielded a steadily declining success rate to the point that there is a 40 percent chance of sustaining a major or fatal injury during ejection. At the same time, especially under combat conditions, the speed at which ejection is attempted is increasing into the speed range where limb flailing and wind blast injuries are likely to occur. The objective of this program is to identify high-payoff solutions to the problem of providing successful crew escape throughout the performance envelope of aircraft capable of sustained high-speed flight.

This program covers the investigation, conceptualization and trade-off study of promising concepts that will provide a basis for the development of escape systems that will improve the operational escape success rate and meet the needs of new USAF high-performance aircraft.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

ASTRONAUTICS

Includes Astronautics (general); Astrodynamics; Ground Support Systems and Facilities (space); Launch Vehicles and Space Vehicles; Space Transportation; Spacecraft Communications; Command and Tracking; Spacecraft Design, Testing, and Performance; Spacecraft Instrumentation; and Spacecraft Propulsion and Power. For Related Information See Also Aeronautics.

2.0001, DEVELOPMENT OF A MANUAL EVA GUIDANCE PROCEDURE
W.T. FOWLER, Univ. of Texas, School of Engineering, Aerospace Engin & Engin Mech, *200 W. 21st, Austin, Texas* 78712

DESCRIPTION: Astronauts on Extravehicular Activity (EVA) in the future will not be physically connected to the space shuttle. They will manuever about using manned maneuvering unit (MMU). When the astronaut moves from point to point in space, he must take into consideration the laws of dynamics and orbited mechanics in order to fly the most efficient path from point to point. As a backup to the primary guidance system, manual procedures developed earlier which allow the astronaut to return to the space shuttle without aid from the shuttle are being refined. These procedures are being kept as simple as possible in order that they will be viable as backup procedures.

SUPPORTED BY University of Texas

2.0002, ANALYTICAL THEORY FOR THE GEOSYNCHRONOUS SATELLITE
P. NACOZY, Univ. of Texas, School of Engineering, Aerospace Engin & Engin Mech, *200 W. 21st, Austin, Texas* 78712

DESCRIPTION: We are developing a first-order solution for the synchronous satellite. The solution includes effects due to the dominant zonal and tesseral harmonies of the earth's gravitational potential as well as effects due to the sun and the moon and due to solar radiation pressure.

SUPPORTED BY University of Texas

CHEMISTRY AND MATERIALS

Includes Chemistry and Materials (general); Composite Materials; Inorganic and Physical Chemistry; Metallic Materials; Nonmetallic Materials; and Propellants and Fuels.

3.0001, DEVELOPMENT OF DIRECTIONALLY SOLIDIFIED EUTECTIC NICKEL AND ALLOYS
F. LEMKEY, United Technologies Corp., Research Laboratories, *400 Main St., Hartford, Connecticut* 06108 (DN590014; N62269-76-C-0107)

To develop the ductile matrix/ductile fiber eutectic gamma prime/gamma plus alpha nickel base alloy for turbine blading operable at 1850 degrees and above.

Elements are being added to the system based on Ni-31% Mo-6.2% Al, including Cr, Co, Fe, Ta, W, Re, Ti and C. Strength, ductility, oxidation-sulfidation resistance, thermal fatigue, and creep are being evaluated.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

3.0002, SINGLE-CRYSTAL SUPERALLOYS FOR TURBINE BLADES
D.N. DUHL, United Technologies Corp., Pratt & Whitney Aircraft Group, *P.O. Box 2691, West Palm Beach, Florida* 33402 (DN890005; N00019-77-C-0512)

To develop single-crystal nickel base superalloys as single crystals for high temperature aircraft gas turbine blading.

Alloys based on the composition Ni-5Al-2Ti-12W-1CB-9Cr will be developed in single crystal form. Variations of refractory metals, titanium, and aluminum will be studied. Mechanical properties and oxidation-sulfidation resistance of optimum alloys will be determined at temperatures to 2,000 degrees F.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Sea Systems Command

3.0003, TITANIUM FIRES, TITANIUM ALLOY IGNITION AND COMBUSTION STUDY
B.A. MANTY, United Technologies Corp., Pratt & Whitney Aircraft Group, *P.O. Box 2691, West Palm Beach, Florida* 33402 (DN881167; N62269-76-C-0439)

The objective of this task is to apply the Glickstein model to various titanium alloys used in jet engines (Ti-8-1-1, Ti-6-4, Ti-66-3, Ti-6-2-42, Ti-6-2-4-6) at several temperatures and establish its validity by studying the ignition and propagation characteristics in simulated compression environments. Determine parameters for design engineers. This contract supports work unit ZM501, DN 681081.

Ignition and sustained combustion of titanium alloys are closely related phenomena. A laser beam will be utilized to cause ignition of an airfoil-shaped specimen in a special test rig. The aerodynamic and propagation mechanisms will be varied to simulate actual conditions. Once the various mechanisms are understood, the Glickstein analytical combustion model will be tested for its accuracy in predicting the process. The end result is to have significant parameters to provide titanium fires in operational jet engines.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

3.0004, THE EFFECT OF MICROSTRUCTURAL FEATURES ON CORROSION FATIGUE OF HIGH STRENGTH ALUMINUM ALLOYS
E.A. STARKE, Georgia Inst. of Technology, School of Engineering, Chemical Engin, *225 North Ave. N.W., Atlanta, Georgia* 30332 (DF051130; AF-AFOSR-3471-78)

AF function - the longevity, reliability and safety of aerospace structures are related to the fatigue properties of the structural materials used. Fatigue phenomena are environment sensitive and the alternating moisture and temperature conditions experienced by aircraft are extreme handicaps when designing for fatigue resistance. Opportunity - corrosion fatigue is a prime cause of failure of the high-strength aluminum alloys used for air-

craft structures and improvements in fatigue resistance awaits the understanding of alloy-environment-load relationships. Objective - this research will correlate microstructural features of structural aluminum alloys with cyclic stress/strain response and crack propagation under selected environmental conditions in order to distinguish those features which control the corrosion fatigue behavior. How work contributes - since aluminum alloys form a major portion of the material currently used for skin and other structural airframe applications, it is appropriate that they are the basis of this investigation.

Special high-strength aluminum alloys based on 7050, and special processing procedures have been selected for separating the effects of the primary microstructural variables - grain structure, subgrain structure, degree of recrystallization, alloy content and type of precipitate. After the relationships between these features and corrosion fatigue behavior have been established and understood, improvements in performance by alloy design can be expected.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0005, SPECTROSCOPIC STUDIES AT LOW TEMPERATURES - I. STRUCTURE AND PROPERTIES OF VAN DER WAALS MOLECULES - II. VIBRATIONAL ENERGY IN LIQUIDS

G.E. EWING, Indiana University, Graduate School, Chemistry, *2805 E. 10th, Bloomington, Indiana* 47401 (CHE76-18721 A02)

Dr. Ewing will continue spectroscopic experiments aimed at characterizing the structure and properties of new van der Waals molecules such as those of the type X2-Y (e.g. N2-Kr, O2-Xe, F2-Ar), (F2)2, CO2-Ar, etc. This work taken together with that from other laboratories should yield a deeper understanding of intermolecular interactions.

Dr. Ewing will attempt new experiments for the purpose of developing theoretical models for vibrational energy transfer in liquids. He will attempt to build the first IR liquid laser.

Finally Dr. Ewing will explore unusual chemical reactions induced by molecules in liquids in high vibrational energy states. This work is a continuation of that currently supported by Foundation grant GP-37043X.

SUPPORTED BY U.S. National Science Foundation, Div. of Chemistry

3.0006, MICROSTRUCTURAL CHANGES FOLLOWING SUPERPLASTIC DEFORMATION OF TI-6A1-6V

A. ROSEN, Israel Inst. of Technology, *Haifa, Israel* (DF289520; AF-AFOSR-3441-77)

AF function - research in improved and lower-cost air frame components. Deficiency - present methods for the fabrication of titanium components result in high cost. Furthermore, little is known of the post-forming response of superplastically shaped titanium, a low-cost approach. How research contributes - it is expected to find answers to the following questions - (1) what is the effect of temperature on the mechanism of superplastic deformation? It is well known that the volume fraction of beta is strongly temperature-dependent, and therefore, the change of the alpha/beta ratio may influence the deformation mechanism. (2) If superplastic deformation is controlled by grain boundary sliding, what is the role of the alpha-alpha, beta-beta and alpha-beta grain boundaries? (3) What is the mechanism which eliminates void formation during grain boundary sliding? (4) Is there any change of structure due to superplastic deformation? (5) What is the role of plastic deformation on grain growth?

The aim of the proposed research is to understand the mechanism of superplastic deformation of Ti-6Al-4V by means of direct observation of the structure in the transmission electron microscope. Direct observation of the microstructure and the structural changes which take place during superplastic deformation is not feasible due to lack of appropriate equipment. Instead, this approach is to freeze-in the high-temperature structure which develops during superplastic forming, and to compare it with the structure which develops under similar conditions, but without application of stress. Tensile testing will be carried out in vacuum at various temperatures and strain rates in a specially designed apparatus.

SUPPORTED BY U.S. Dept. of Defense, Air Force, European Office of Aerospace Research & Development

3.0007, NON-DESTRUCTIVE EVALUATION (NDE) FOR ADVANCED AIRFRAME CONCEPTS

R.C. DEITRICH, U.S. Navy, Air Engineering Center, *Lakehurst Naval Air Station, Lakehurst, New Jersey* 08733 (DN896006)

To ascertain and characterize the intermediate and organizational level inspection criteria peculiar to composite airframe structures.

Define modes of deterioriation and/or failure for composite airframe structures and evaluate techniques of NDT such as mechanical impedance, acoustic emission, ultrasonics, n-ray, microwaves, thermographics and eddy current for applicability and effectiveness of detecting such flaws.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

3.0008, ALTERNATE FUELS NITROGEN CHEMISTRY

J.W. FRANKENFELD, Exxon Res. & Engineering Co., Gov Research Labs, *1600 Linden Ave., Linden, New Jersey* 07036 (DN890054; N00019-78-C-0177)

The objective of the program is to find the effect of the presence of nitrogen compounds in shale-derived alternate jet fuels on the storage stability of the fuel.

Deposit formation will be studied as a function of pyrrole, indole and carbazole compounds in n-decane. Effects of trace materials which inhibit sedimentation will be studied. The kinetics and mechanisms of formation of deposits will be studied and the structures characterized.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

3.0009, FEASIBILITY OF DIESEL FUEL MARINE AS AN EMERGENCY AIRCRAFT FUEL

C.J. NOWACK, U.S. Navy, Air Propulsion Test Center, *Trenton, New Jersey* 08641 (DN789752)

To determine the suitability or adaptability of diesel fuel marine (DFM) or mixtures of DFM and JP-5 for emergency use in gas turbine engine powered aircraft during shortages of JP-5.

Evaluate DFM and blends with JP-5 by standard JP-5 specification tests. Determine combustion performance and performance of aircraft fuel pumping and metering equipment. Evaluate compatibility with aircraft materials and with fuel decontamination equipment. Determine limitations on use of DFM and possible applications to future aircraft designed for broad-specification fuels.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Material Command

3.0010, HIGH-TEMPERATURE PLASTIC FLOW IN A15 SUPERCONDUCTING COMPOUNDS

R.N. WRIGHT, Rensselaer Polytechnic Inst., School of Engineering, Materials Engineering, *110 8TH St., Troy, New York* 12181 (DMR78-05726)

This is a continuation of research on the high-temperature plastic deformation of A15 superconducting compounds. Continued use will be made of hot isostatic pressing to produce low-porosity materials with maximal A15 matrix phase content. The effects of refined grain size on stress-strain rate-temperature (S-SR-T) response will be evaluated through study of Zr-doped Nb3Sn. A refined grain size should facilitate plastic deformation by abetting diffusional flow deformation mechanisms, and is required to achieve enhanced critical current values. The effects of variations from stoichiometry on S-SR-T response will be studied on a range of V3Ga specimens. Thorough microstructural characterization will be undertaken. Mechanical behavior will be evaluated through the use of deformation mechanism mapping techniques, in an effort to identify micromechanism of deformation, and to provide a basis for comparison with other materials. Critical temperature, critical current and low-temperature heat capacity measurements will be undertaken, and the results ob-

tained correlated with microstructural observations and mechanical behavior in order to assess the effect of high-temperature deformation on superconducting properties. A detailed consideration of dislocation geometry and motion in A15 compounds will be done using electron transmission microscopy. An evaluation of the influence of hydrostatic pressure on high-temperature Nb3Sn fracture behavior will be performed using constrained plastic flow testing analogous to direct extrusion. The results of this study are expected to serve as a scientific basis from which it may be possible to control deformation processing parameters in order to achieve acceptable superconducting properties in A15 and related superconducting materials. This is a continuation of research, previously funded under NSF Grant DMR76-00554. This is the first year of a three year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

3.0011, COMBUSTION MODELING STUDIES

R.P. BRADLEY, U.S. Air Force, Aeropropulsion Laboratory, *Wright Patt. A.F.B., Dayton, Ohio* 45433 (DF461200)

Design and run experiments to evaluate existing combustor models.

The experimental design will determine- (1) combustor configuration, (2) initial conditions, (3) fuel type, (4) spatial measurement locations, and (5) model predictions of temperature, specie concentration, and velocity profiles. Advanced optical techniques will be used to make the desired profile measurements.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aero Propulsion Lab.

3.0012, ENVIRONMENTAL IMPLICATIONS OF ALTERNATE FUELS

T. JACKSON, U.S. Air Force, Aeropropulsion Laboratory, *Wright Patt. A.F.B., Dayton, Ohio* 45433 (DF409540)

To determine the changes in the quality and quantity of pollutants emitted by various blends of potential AF alternate jet fuels when burned in three different combustor types or utilized in various AF fuel handling systems.

Up to twelve different blends of potential AF alternate jet fuels will be burned in three different combustor types (low-pressure can, high-pressure can, and high-pressure annular) to determine the changes in the quality and quantity of emitted pollutants (NOX, CO, smoke, and UBHC). Certain physical and chemical properties of the fuel blends will also be determined. The work will be accomplished by the AFAPL through multiple contracts with industry. The appropriate AFAPL JONs are as follows: 30480581 (low-pressure can), 30480584 (high-pressure annular), and 30480595 (high-pressure can).

SUPPORTED BY U.S. Dept. of Defense, Air Force, Civil & Environmental Engineering Development Office

3.0013, AFAPL SENIOR INVESTIGATOR PROGRAM

J.D. PINSON, Univ. of Dayton, Res. Inst., *300 College Park Ave., Dayton, Ohio* 45409 (DF461700; F33615-77-C-2069)

The objective of the AFAPL senior investigator program is to obtain assistance in solving complex and persistent problems involving air-breathing propulsion (turbine engine and ramjet engine), aviation fuels and lubrication, fire protection, and related systems and materials.

A separate and specific task will be established to perform work for each individual area of study when the need is identified. The contractor shall designate a principal investigator who will be responsible for assigning a senior investigator to perform each task.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aero Propulsion Lab.

3.0014, SEMI-BATCH PRODUCTION OF RJ-5 FUEL

L. HALL, Sun Oil Company, *1608 Walnut St., Philadelphia, Pennsylvania* 19103 (DF460170; F33615-76-C-2109)

The objectives of this program are twofold. The first is to produce 5,600 gallons of RJ-5 for use in the Advanced Strategic Air Launch Missile program (ASALM). The other is to characterize the physical properties of the RJ-5 produced by the batch process scheme.

The RJ-5 will be produced by a batch process scheme which consists of the following units: purification of raw material, dimerization, hydrogenation, distillation, and final RJ-5 cleanup. The physical properties of each RJ-5 batch are to be determined and correlated to the process variables.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aero Propulsion Lab.

3.0015, MATERIALS SUPPORT TECHNOLOGY - MECHANISMS OF IMPACT DAMAGE AND FRACTURE FOR CERAMICS

H.P. KIRCHNER, Ceramic Finishing Company, *P.O. Box 498, State College, Pennsylvania* 16801 (DN475309; N00014-74-C-0241)

Ceramics are useful as engineering materials for a variety of components, e.g., IR domes, radomes, gas turbine parts and reentry bodies. Understanding of fracture mechanisms is needed to attempt to protect ceramic components against in-service damage due to loading such as particle impact. This work is aimed at analysis of impact response in ceramics due to small particle impact and related aspects of fracture. Factors governing surface damage formation and multiparticle erosion are being defined.

Quantitative fractography will be used to characterized impact damage and subsequent fractures in polycrystalline ceramics and glasses. Detailed mechanisms of cracking are being determined. This includes characterization of flaws at which cracking starts, and comparison of these flaws with those causing failure in ordinary strength tests.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

3.0016, MECHANISM OF ANTIWEAR ADDITIVE ACTION IN POLYSILOXANE FLUIDS - MECHANISTIC CONSIDERATIONS

A. CONTE, U.S. Navy, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974 (DN581138)

Initiate a systematized research effort to (a) establish correlations between chemical structure and performance for new heat-stable antiwear lubricant additives, (b) gain new modern insights into the mechanisms of antiwear additive protection, and (c) synthesize new heat-stable antiwear lubricant additives. A complete understanding of the chemical aspects associated with antiwear additive synthesis and functionality will provide direction information for the development of new and improved high-temperature military aircraft fluids and greases.

An extensive literature survey would be made to learn the relationships which exist between the chemistry and the performance of antiwear lubricant additives; and to learn what new classes of compounds have recently been proposed for this purpose. Various fluids incorporating antiwear additives will be analytically investigated under controlled experimental conditions in order to establish lubricating performance properties. Differences in performance characteristics will be related to bearing composition and geometry as well as chemical structure of both the base fluid and antiwear additive. In addition, chemical thermodynamics and kinetics will be used to effectively predict lubricating performance and thereby guide the application and use of these materials.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

3.0017, RESEARCH ON CATASTROPHIC DAMAGE PHENOMENA AND DAMAGE CONTROLLING NAVAL AIRCRAFT ALLOYS

J.J. DELUCCIA, U.S. Navy, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974 (DN781418)

Technical objective - to develop advanced materials science concepts for fracture and corrosion control. To study environ-

mental embrittlement phenomena of high-strength steel, titanium and aluminum alloys using an integrated mechanistic approach. Determining the effect of hydrogen on the embrittlement of, and the means for its mitigation in high-strength alloys is vital to the use of such material in high-performance aircraft.

Approach - damage control will be approached from two standpoints: prevention of embrittlement through process control and arrestment of corrosion and crack propagation through the development of new compounds that could be applied in-situ. The idea of minimizing electrochemical hydrogen entry into metals by imposing physical constraints such as electromagnetic fields will be investigated. Based on the chemistry of the laboratory's successful corrosion preventive compounds, crack arrestment compounds capable of displacing moisture from the crack tip and providing inhibition will be developed. The diffusion of embrittling hydrogen in high-strength aircraft alloys will be studied using the electrochemical permeation and metallurgical techniques in various chemical and mechanical environments.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

3.0018, DEVELOPMENT OF METAL LAMINATE SYSTEMS

R.D. GOOLSBY, Advanced Technology Ctr. Inc., *P.O. Box 6144, Dallas, Texas* 75222 (DN790031; N00019-77-C-0287)

Develop metal laminate systems for air structural applications.

Explore titanium and aluminum laminate combinations bonded by brazing, weld bonding, or explosive bonding.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

3.0019, DEFORMATION CHARACTERISTICS OF SLOWLY GROWING FATIGUE CRACKS

J. LANKFORD, Southwest Research Institute, *8500 Culebra Rd., San Antonio, Texas* 78228 (DF036370; F44620-75-C-0050)

AF function - current and future needs of the Air Force depend upon significant advances in structural materials. The synthesis of new and improved metals as well as the fundamental understanding of the behavior and performance of such metals are essential to superior operation in the aerospace environment. Opportunity - in order to formulate valid and general predictive relations describing fatigue crack growth under varying thermal and environmental conditions, knowledge of crack tip strain fields and deformation modes are needed. Objective - this research will determine the interrelation between crack growth rate and plastic zone characteristics and the way in which spectrum loading effects, alloying effects, environment, temperature, and load history alter the plastic characteristics. How work contributes - this research will result in increased understanding of the mechanisms of crack extension, and improvement of existing plasticity correction factors used in crack growth laws based on linear elastic-fracture mechanics.

The objective will be accomplished by mapping the plastic zones about the tips of fatigue cracks in notched specimens. Cracks will be grown under carefully controlled environmental and thermal conditions. Measurements will be carried out primarily by analysis of selected area electron channeling patterns, supplemented by scanning electron microscopy and replica transmission electron microscopy.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0020, FAST ION TRANSPORT IN SOLIDS

A.V. CHADWICK, Univ. of Kent, *Canterbury, England, United Kingdom* (DF049790; AF-AFOSR-3427-77)

AF function - power generation and distribution is required for the operation of the electrical equipment for increasing in-flight speed and performance. Deficiency - need for information of the basic mechanisms of solid electrolyte type materials used in battery and fuel cell technology. Objective - to develop fundamental information about the basic mechanisms of ionic transport, the point defect structure and self-diffusion parameters in solid-state electrolyte materials. How work contributes - results will provide important basic information on fast fluoride ion diffusion, and increase the potential for discovery of new fast ion conductors. Application of devices using these materials will provide advantages of longer working temperature range, long 'shelf-life', and easy miniaturization.

Conductivity-NMR techniques are to be employed to study ionic transport in three types of fluorides which exhibit fast ion conduction. The three types of materials are described as rare earth fluorides, tysonite-related fluorides, and mixed fluorides. Through the application of various techniques, the following data will be obtained - accurate diffusion parameters for the constituent ions, identification of the mechanisms of diffusion, information on the point defect structures, and the relevance of the phase transitions and their effect on ionic transport. The results and interpretations will be particularly relevant in solid-state technology and in ion transport in high-temperature insulating materials.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

ENGINEERING

Includes Engineering (general); Communications; Electronics and Electrical Engineering; Fluid Mechanics and Heat Transfer; Instrumentation and Photography; Lasers and Masers; Mechanical Engineering; Quality Assurance and Reliability; and Structural Mechanics. For Related Information See Also Physics.

4.0001, FREE FLIGHT ROCKET TECHNOLOGY/LOW COST

W.S. CROWNOVER, U.S. Army, Technology Laboratory, *Redstone Arsenal, Huntsville, Alabama* 35809 (DA0F1424; DAAH03-77-C-0122)

Demonstrate the performance of low-cost pitch carbon ablative materials for free flight rocket motor application.

The approach will include selection with rationale of candidate materials, fabrication and testing of typical specimens, evaluation of ablation data, comparison to analytical predictions and engineering documentation. Four full-scale nozzles (10 inches long, by 6.625 inches diameter) will be fabricated and delivered for future motor integration evaluation.

SUPPORTED BY U.S. Dept. of Defense, Missile Research & Development Command, Free Flight Rocket Technical Office

4.0002, AUTOMATIC LAUNCHING/LOADING TECHNIQUES - HELICOPTER SYSTEMS

G.T. LAMAR, U.S. Army, Technology Laboratory, *Redstone Arsenal, Huntsville, Alabama* 35809 (DA0G1009)

Investigate the depot-to-fire sequence of future systems and develop transport-load-launch-reload concepts minimizing manpower requirements and total sequence time for helicopter launch systems.

A full study of the techniques for rapid load and reload of helicopters will be conducted. Automatic boresighting features, self-loading hardback design, rough terrain loaders and techniques to satisfy the complete wooden round philosphy will be investigated. A tri-service/NATO survey will be conducted. Prototype hardware of promising concepts will be designed, developed, and tested.

SUPPORTED BY U.S. Dept. of Defense, Missile Research & Development Command, Ground Equipment & Missile Structures Directorate

4.0003, TERMINAL GUIDANCE TECHNOLOGY - GUIDANCE SYSTEM, INTEGRATION AND VERIFICATION

J.P. LEONARD, U.S. Army, Technology Laboratory, *Redstone Arsenal, Huntsville, Alabama* 35809 (DA0F1029)

To establish a validated technology data base on advanced terminal guidance techniques.

To evaluate and establish performance capabilities and limitations of advanced terminal homing guidance techniques and

their hardware implementations by: developing six degree of freedom, digital simulations, continually validating these simulations by utilizing available field target scene measurements data and performance data from breadboard prototype hardware components, utilizing these simulations to generate hardware specifications for procurement, developing hardware-in-the-loop simulations, conducting laboratory, captive and missile flight tests of prototype flightworthy hardware.

SUPPORTED BY U.S. Dept. of Defense, Missile Research & Development Command, Advanced Sensors Directorate

4.0004, LED (LIGHT EMITTING DIODE) WATER ACTIVATED SWITCH

W.D. RAFTERY, Koch & Sons, *Anaheim, California* 92807 (DN881342; N62269-77-C-0367)

To develop a fail-safe water-activated parachute canopy release device for use in Navy aircraft. This contract supports work unit ZB104, Agency Accession No. DN681085.

Twelve prototype led (light emitting diode) water activating switches will be designed and manufactured. These switches automatically release the parachute/harness fittings by use of an electrically explosive piston actuator. After delivery of the prototypes, an in-house test and evaluation program will be conducted.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

4.0005, COMMUNICATIONS - VECTOR ELECTRIC FIELD MEASUREMENTS ON BALLOONS AND SATELLITES

F.S. MOZER, Univ. of California, Space Sciences Laboratory, *3 Leuschner Observatory, Berkeley, California* 94704 (DN724005; N00014-75-C-0294)

The degradations and disruptions of naval electromagnetic systems caused by ionospheric irregularities, particle precipitation, and geomagnetic storms include scintillation of satellite signals, HF fading and absorption, auroral clutter on HF, VHF, and UHF radar, and attenuation and phase anomalies of VLF and ELF communication and navigation signals. The purpose of this research is to determine the causes of these phenomena and their effects on Navy systems.

In situ measurements of AC and DC electric fields, AC magnetic fields, plasma density irregularities, and plasma density and temperature are taken by the ONR 104 experiment on the S3-3 satellite. these data will be analyzed to determine the source of auroral particle acceleration, the causes of ionospheric irregularities, the magnitude of EXB plasma motions, and the propagation characteristics of electromagnetic waves.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0006, NONOPERATING FAILURE RATES FOR AVIONICS

G. KERN, Hughes Aircraft Company, *Centinela Ave. & Teale St., Culver City, California* 90230 (DF737740; F30602-77-C-0187)

The objective of this study is to determine the magnitude of avionic nonoperating failure rates to enable more accurate extrapolation from predictions and test data. Contract F30602-74-C-0221, completed SEP 76, provided regression equations relating predicted, demonstrated and field reliability for avionic equipment. The objectives of that study were realized. The study, however, indicated that one of the reasons for the field reliability of avionic equipment being consistently below predicted and demonstrated values, was that a significant number of failures occurred during nonoperating hours. Some avionics are operated only 6 percent of available time and failures in nonoperating periods are not taken into account by reliability predictions or demonstrations. (It should be noted that it has been shown that missile systems do experience failures even under dormant conditions which are far more benign than the nonoperating avionic environment.)

Data will be collected on avionic equipment to establish at least average nonoperating failure rates, field and predicted reliabilities. Relationships between these measures will be verified.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

4.0007, HELMET-MOUNTED DISPLAY (HMD)

R. LOHMANN, Hughes Aircraft Company, *Centinela Ave. & Teale St., Culver City, California* 90230 (DN881383; N62269-77-C-0504)

Conduct a three-phase development of a HMD that will have more efficient aircraft weapon control and delivery capability than conventional aircraft weapon control systems. This contract supports work unit ZA601, Agency Accession No. DN681080.

Phase one will demonstrate the feasibility and advantages of a binocular, stereoscopic HMD in order to eliminate retinal rivalry and suppression of display image as may occur in a monocular display, and to add a new dimension of true depth perception in displays. The second phase will involve verification of the concepts developed in phase one and will interface helmet and electronic design with weapon systems. Phase three will be a full-scale development of the improved system.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

4.0008, INVESTIGATION OF JUNCTION FIELD EFFECT TRANSISTORS

K. LEHOVEC, Univ. of Southern California, School of Engineering, Electrical Engin, *3551 University Ave., Los Angeles, California* 90007 (ENG76-84530 A01)

The objective of this program is the electrical characterization of the interface between a semiconducting channel and an insulating substrate to determine those electrical parameters which are of importance for field effect transistor design. The semiconductor-substrate combinations to be studied are silicon on sapphire, and semiconducting gallium arsenide on semi-insulating gallium arsenide.

The Shockley-Read-Hall parameters pertaining to the surface states at the silicon-sapphire interface will be derived by (1) applying and extending the transient current method recently developed under this program and (2) by using the standard metal-oxide-semiconductor capacitance-voltage and resistance-voltage methods in conjunction with the metal/sapphire/interdigital silicon test structure developed in the program.

The gradual transition between an ion-implanted n-channel and a chromium-doped semi-insulating gallium arsenide substrate will be studied using distributed network analysis and the dual bias method for determining impurity profiles. The latter method eliminates the ambiguities arising from capacitance-voltage measurements with nearly pinched-off channels. This is a continuation of research under NSF grant ENG-7405551.

SUPPORTED BY U.S. National Science Foundation, Div. of Engineering

4.0009, THE EVALUATION OF TURBULENCE MODELS BY NUMERICAL SOLUTIONS OF THE NAVIER-STOKES EQUATIONS

J. FERZIGER, Nielsen Engin. & Research Inc., *850 Maude Ave., Mountain View, California* 94040 (DN775080; N00014-77-C-0008)

The development of accurate models of turbulence is central to the formulation of reliable design methodologies for predicting viscous flow phenomena associated with aircraft, missiles and ships. The proposed research will utilize 'exact' solutions of the Navier-Stokes equations to assess commonly used turbulence closure models.

In the present research, the Navier-Stokes equations will be solved, numerically, by finite-difference and spectral methods to provide numerical data with which turbulence closure models can be assessed. Initially, calculations by finite difference and by spectral methods will be compared for the case of homogeneous isotropic flow. Subsequently the spectral method will then be used to predict homogeneous nonisotropic (mean shear and strain) flows.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0010, ION IMPLANTATION IN SEMICONDUCTORS
J.W. MAYER, Calif. Inst. of Technology, Graduate School, Electrical Engin, *1201 E. California Blvd., Pasadena, California* 91109 (INT78-08779)

The objective of this continued cooperative research project is to advance basic knowledge of the structures and properties of thin-film materials, which may lead to new and improved semiconducting devices such as integrated circuits.

The aim is to investigate the use of ion implantation systems for analyzing implanted semi-conducting materials, and for forming silicon-germanium heterojunctions. Rutherford backscattering techniques at low-energy levels (300-800 KeV) will be explored as an analytical tool; the regrowth of an amorphous layer produced by ion implantation with that of the epitaxial growth of an evaporated film will be studied to see if the fashion heteroepitaxial growth can be induced.

This grant is for the continuation of a previously funded project investigating the implantation process in semiconductor (NSF Grant OIP-7401930 A01). The work will be conducted in cooperation with Dr. Jozsef Gyulai of the Central Institute for Physics, Budapest, Hungary.

SUPPORTED BY U.S. National Science Foundation, Div. of International Programs

4.0011, DISTRIBUTED AIRBORNE INFORMATION PROCESSING SYSTEMS ARCHITECTURE
H.F. WONG, U.S. Navy, Comm. Systems & Tech. Dept., *San Diego, California* 92152 (DN787559)

Investigate the problem of control for a distributed information processing architecture which can readily adapt to and recover from hardware failures.

Review latest distributed processing architecture advances. Update the distributed architecture design developed by NELC and UCLA. A distributed processing laboratory model will be implemented for detailed investigations of distributed control, fault detection and system recovery techniques. An airborne application will be investigated for possible implementation with the laboratory model.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

4.0012, WORLDWIDE PERFORMANCE OF TACTICAL MILLIMETER WAVE RADIO LINKS
N. FELDMAN, Rand Corporation, *1700 Main St., Santa Monica, California* 90406 (DA0F2854; DAAB07-77-C-0142)

The objective of this study program is to investigate the environmental performance of tactical millimeter wave transceivers operating in frequency bands from 35 gHz through 75 gHz, with voice, TV and data communications.

Using available worldwide rainfall data, calculations will be performed on radio fading, link performance, maximum range, outage/availability. Automated techniques for increasing link availability will be investigated by analyzing various operating parameters - power transmission, space, time/frequency diversity techniques, or a combination thereof. An investigation will be made of whether an enemy can use satellite meteorological data, airborne/ground weather radar data/sensor information, to determine if Army millimeter wave radio outages exists in order to gain tactical advantage.

SUPPORTED BY U.S. Dept. of Defense, Communications Research & Development Command, Communications Systems Center

4.0013, CGI TECHNIQUES EVALUATION
D. COHEN, Univ. of Southern California, Information Sciences Institute, *Venice, California* 90291 (DN794044; N61339-77-C-0154)

The objective if this task is to conduct a state-of-the-art survey on the application of computer generated imagery (CGI) to flight simulation devices, a technological forecast of advances, and assess the future of this technology and its impact on Navy flight training in the early 80's.

The survey will address the following issues: (a) state-of-the-art (b) human factor aspects (c) expected future progress (d) probable impact of new technology.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Training Equipment Center

4.0014, MODIFICATION TO PORTABLE MILLIMETER COMMUNICATION UNITS
S. AMOROSO, United Technologies Corp., Norden Division, *Helen St., Norwalk, Connecticut* 06856 (DN881001; N62269-77-M-3308)

NavAirDevCen is performing tests to compare electrooptic and millimeter portable communications equipment for aircraft-to-aircraft communications. This contract supports work unit ZC902, Agency Accession No. 681082.

Two millimeter devices are being borrowed from norden for use in these tests. Slight modifications may be necessary to make these devices equal to the electrooptical units being purchased.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

4.0015, DEVELOPMENT OF A PROJECT CONTROL MANAGEMENT SYSTEM (PCMS)
E. SULLIVAN, U.S. Natl. Aero. & Space Adm., *600 Independence Ave. S.W., Washington, District of Columbia* 20553 (AT-70004; UM160254 (TRAIS NO.))

NASA will arrange for full-time on-site personnel, to be located in the Office of Transportation Administration, Metropolitan Dade County, Miami, Florida, in order to develop definitive applications of NASA-developed Risk Management, Configuration Management and Quality Assurance to the Metro Dade County Rapid Transit Project.

SUPPORTED BY U.S. Dept. of Transportation, Urban Mass Transportation Admin.

4.0016, GLOBAL EXTENDED RANGE AUTOMATED ENVIRONMENTAL PREDICTION SYSTEM
R.V. MADALA, U.S. Navy, Res. Laboratory, *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN680041)

To provide a comprehensive numerical modeling program geared to the advanced research and development phase of Navy atmospheric environmental forecasting.

The general approach will be to solve numerically the equations of hydrodynamics, thermodynamics, and photochemistry relevant to the various atmospheric regions and processes on large digital computers. The techniques employed (e.g., finite differences, spectral expansions, movable nested grids, etc.) will be specifically tailored to particular atmospheric phenomena or regions and associated initial and boundary conditions.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

4.0017, EFFECTS OF TIME- AND TEMPERATURE-DEPENDENT LOADINGS ON NAVAL STRUCTURES
B.A. BOLEY, Northwestern University, Technological Institute, Civil Engin, *633 Clark St., Evanston, Illinois* 60201 (DN623656; N00014-75-C-1042)

The objective is the development of methods for prediction of stress and deformations in naval structures where thermal loading is important. Such structures include rocket engine components, ablating heat shields, radar and satellite antennas, and nuclear reactor components.

Current research deals with (a) the adaptation of certain engineering methods of heat conduction and thermal stress analysis to problems with temperature-dependent material properties and inelastic behavior, and (b) the establishement of design criteria for nuclear reactor components, particularly including meltdown considerations.

ADDENDA: Supporting agency address is: Office of Naval Research Arlington, VA 22217

SUPPORTED BY U.S. Dept. of Defense, Navy

4.0018, SEMI-EMPIRICAL CORRELATIONS FOR AIRCRAFT EXHAUST EMISSIONS AND STANDARDS

A.M. MELLOR, Purdue University, School of Mechanical Engin., *Executive Bldg., Lafayette, Indiana* 47907 (R804443-01; B130 - 001)

This is one of a multi-part project whose summary may be identical to others.

Semi-empirical characteristic time correlations for pollutant emissions developed for simplified aircraft gas turbine combustors will be compared with exhaust emissions data for existing aircraft engines to test their applicability for the latter. The previous work indicates that an optimum geometry for minimum emissions can be defined for given combustor operating conditions and that the optimum simplified turbine combustor cannot meet 1979 Class T2 EPA emission standards. If the correlations can be extended to more representative aircraft combustors, then it should prove possible to determine if the optimum combustor can satisfy the appropriate EPA aircraft standards; the work should thus prove helpful in exploring the stringency of the standards.

SUPPORTED BY U.S. Environmental Protection Agency, Office of Research & Development, Industrial Environmental Research Lab.

4.0019, SURVEILLANCE - INVESTIGATION OF PROPERTIES OF RADAR BACKSCATTER FROM SEA ICE

R.K. MOORE, Univ. of Kansas, Center for Res. Incorporated, *122 Strong Hall, Lawrence, Kansas* 66044 (DN775037; N00014-76-C-1105)

The objective of this effort is to provide backscatter properties of sea-ice to permit better interpretations to be made of the sea ice imagery taken during overflights of the arctic with remote sensors; and to establish optimum parameters for future remote ice-measuring systems.

A transportable radar scatterometer is to be assembled capable of variable frequency operation in the 12-18 gHz band and fixed frequency operation of 1.2 gHz. Using this equipment and varying the frequency, polarization, and angle of incidence, microwave measurements of arctic sea ice (first-year ice, multi-year ice and pressure ridges) are to be made to determine electrical permittivity, electrical conductivity, and ice roughness. The results are to be analyzed and the optimum design parameters for radars to be employed for remote sea-ice monitoring from spacecraft or aircraft are to be generated.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0020, NUMERICAL STUDIES OF UNSTEADY SUPERSONIC MIXING FLOWS

J.D. ANDERSON, Univ. of Maryland, School of Engineering, Aerospace Engineering, *College Park, Maryland* 20740 (DN775431; N00014-77-C-0257)

Mixing phenomena play a central role in many fluid dynamic applications ranging from the flow at the trailing edge of a wing to the flow in a chemical laser. The proposed research will examine, numerically, the mixing between two co-flowing jets in which oscillations, representative of controlled input disturbances, will be introduced.

In recent years significant progress has been made in the interpretation of the nature of the mixing of two, steady, planar, co-flowing jets. The planned numerical work will examine the influence of controlled time-dependent disturbances on the diffusion between the two jets. The calculations will use the time-dependent Navier-Stokes equations. Jets of the same composition as well as dissimilar jets will be studied. For turbulent flows, a kinetic energy model will be used.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0021, HIGH-ENERGY LASER RESEARCH

J.L. WAGNER, U.S. Navy, Surface Weapons Center, *Silver Spring, Maryland* 20910 (DN934368)

To do theoretical research leading toward more accurate solutions of high temperature, vibrationally excited, chemically reacting, and radiating flow fields of missiles and jet aircraft. This is needed to accurately predict heating loads on the outside skin to obtain the aerodynamic forces which influence the weapons accuracy, to predict plasma properties that govern sensor signal transmission, and to assess the attenuation of laser radiation in highly absorbing boundary layers. In particular this work pertains to countermeasure techniques against laser weapons and to plasma prediction necessary for terminal sensor evaluation.

Theoretical calculations are being made for laser radiation attentuation in highly absorbing boundary layers on aerodynamic surfaces. Specifically, the problem treats the mass injection of SF6 into an aerodynamic boundary layer, with the subsequent propagation and absorption of a CO2 laser beam through the boundary layer downstream of the injection. For the plasma prediction problem, numerical experiments will be made with a variety of computer codes to assess the effects and accuracy of the analytical model on electron density calculations for a wide range of experimental data.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Surface Weapons Center

4.0022, TURBULENT BOUNDARY LAYER CALCULATIONS

B. WEINBERG, U.S. Navy, Surface Weapons Center, *Silver Spring, Maryland* 20910 (DN785077)

The effort will be aimed at developing efficient, cost-effective computational techniques for the solution of the boundary layer, boundary region and Navier-Stokes equations in two and three space dimensions. Such methods are necessary to accurately predict the effects of viscous forces on aircraft and missile performance, heating rates, skin friction distributions and zones of separation. Furthermore, they can be used as design tools for Navy vehicles such as reentry and cruise missiles.

Since the governing viscous flow equations are parabolic in nature or can be cast into parabolic form, finite-difference matching techniques will be employed. However, the novelty in the proposed method will be the use of the fourth-order operator compact implicit scheme, developed at NSWC/WOL, to accomplish the spatial differencing.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

4.0023, OPTICAL PROPERTIES OF IR WINDOWS

T.B. BARRETT, Parke Mathematical Labs. Inc., *1 River Rd., Carlisle, Massachusetts* 01741 (DF902980; F19628-77-C-0037)

AF function - communications, laser weapons systems. Deficiency -a problem common to both communications and laser systems is that of dependable and uniform performance of optical components for use in the infrared. Objective - to evaluate the interdependence of parameters critical to the performance of optical components for use in communications systems and infrared laser systems. This work involves the use of the GFE computer facility support. How research contributes -the proposed investigation will provide a rational basis for determining the proper trade-offs to be made to choose from available materials in the design of optical components with critical and/or extreme characteristics.

This effort involves the development of theoretical models of the optical characteristics of dielectrics and semiconductors, development of the appropriate computer programs, the assimilation and interpretation of complementary experimental data originating in ETS, and comparison of theoretical prediction with experimental results to establish the viability of the models. The results will be used in the design of optical communications devices and high-power infrared laser windows and other components.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

4.0024, SUPPORT OF LARGE-SCALE INTEGRATED CIRCUITS

J. BAUER, U.S. Navy, Air Engineering Center, *Lakehurst Naval Air Station, Lakehurst, New Jersey* 08733 (DN796004)

Develop testing techniques for LSI digital circuitry for operational use in the 1980-90 time frame. The prime objective is to provide for the support of these complex, densely packed circuits.

Test requirements for 1980-90 digital avionics systems have been determined by an investigation of state-of-the-art trend and industry studies in digital testing and maintenance philosophy. These studies will be closely coordinated with advanced digital technologies, built-in-test, and in-flight performance monitoring philosophies. Upon completion of the studies, a demonstration model was built to provide for the evaluation of the concepts developed. A study is presently underway addressing microprocessor applications.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

4.0025, REMOTE SENSING INSTRUMENTATION FOR GAS TURBINE ENGINES (NITRIC OXIDE)

A.F. KLARMAN, U.S. Navy, Air Propulsion Test Center, *Trenton, New Jersey* 08641 (DN796816)

Document and explain the differences between the optical and sample extraction techniques for the measurement of nitric oxide in aircraft engine exhaust plumes.

Conduct a series of well-controlled experiments, using a series of combustion sources of nitric oxide with increasing complexity. Compare levels of nitric oxide as determined by UV and IR spectrometer and standard probe extraction methods.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Material Command

4.0026, ANTENNA FEED TECHNIQUES

P.R. FRANCHI, U.S. Air Force, Rome Air Development Ctr., *Griffiss Air Force Base, Rome, New York* 13440 (DF903710)

The objective of this project is to develop new radar techniques for detecting, locating, and tracking tactical-size ground vehicles and low-flying aircraft in difficult ground clutter and ECM environments. This represents a continuation of work previously conducted under 5635-05-04. The specific objectives for FY77 will be to complete the radar system construction, install the system in the truck testbed, and to conduct tests to assess radar performance. Additionally, trade-off studies of signal parameters for an airborne radar shall be conducted.

Completing radar construction shall entail the design and construction of the radar transmitter, built-in test circuits, and data output interfaces. Concurrently the system software shall be written and debugged, and a radar test plan shall be prepared. Upon verification of hardware and software performance in a laboratory environment the system shall be installed in a truck for execution of the radar test plan. The airborne radar parameter study shall run concurrently with all of the above hardware and software efforts.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

4.0027, COHERENT WIDEBAND IMAGING TECHNOLOGY

P. RANKIN, Syracuse University, Graduate School, *Steele Hall, Syracuse, New York* 13210 (DF911250; F30602-78-C-0049)

This program will continue the development and refinement of high-resolution radar technology required for real time radar imagery for tactical target identification (TTI). The study will address the basic limitations imposed on this capability by radar/target orientation and unknown target motion. The QIC concept will also be pursued as a means of authentic target identification. This program addresses the problem of classification and identification of non-cooperative aircraft through wideband radar, coherent signal processing to determine a target's range and cross range metric and shape characteristics. In particular, this program will address the radar/target orientation and relative motion effects on accurate and reliable image projector plane and focusing for maximum identification performance. In addition, the quiet identification concept (QIC) operational requirements, imaging limitations and radar performance shall be established to demonstrate a solution for authentic identification of friendly aircraft. Existing tactical radars are unable to perform unambiguous identification on non-cooperative targets. This deficiency has been expressed in a number of technical needs, thrusts and C3 planning guides, e.g., TN-ESD/AFCRL-RADC-1709-69-07 (Aircraft Identification Technology) revised Feb 77 and ASD/RW have point study Vol. V, Command, Control and Communications, Oct 1974.

To perform more in-depth studies of the radar/target relative motion problem and its effects and influence on image quality and identification utility. Parametric studies will be performed wherein target orientation, size, velocity, and radar resolution, coherency, etc., will be used to study the effects and limitations on real-time imaging on aircraft classifications. Computer simulations will be developed, refined and extended to aid in the analysis and trade-off studies required. Motion models as well as target scattering models will be developed and tested against suitable simulated and actual data. Studies shall be performed to include QIC operational requirements on imaging and classification performance. QIC simulation will be extended to include more complex coding, enhanced QIC coverage, and physical location. Algorithms developed for motion compensation, image plane determination and image focusing, including QIC-aided identification will be tested through simulation and compared to actual data where possible.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

4.0028, GROOVED RADOME AERODYNAMIC TESTING

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The objective is to determine aerodynamic performance of broadband orthogonally grooved radome configurations when designed for millimeter wavelength (30-100 gHz) frequencies. The radome mockups will have shallow (.050 in) longitudinal grooves on the exterior surface with similar orthogonal grooves on the inner surface. The general radome mock-up shape will be that of a 6/10 in diameter air-to-air missile, there is similar interest in aerodynamic performance for A/C leading edge wing installations for threat warning receiver applications. The purpose of the aerodynamic testing is to determine feasibility of exposed grooves designed for millimeter wavelength frequencies, such that detailed electrical design, development, and testing can be initiated in FY78.

This program will be accomplished through the AF Flight Dynamics Lab drawings of the radome mockup exterior shape and groove dimensions will be given to AFFDL. Construction of the mockup will be accomplished by one of their local support contractors. Testing and data reduction will be performed in-house by AFFDL. The principal measurement to be made is aerodynamic drag induced by the presence of the grooves. Testing will be initially made with grooves in place, subsequently, the grooves will be filled with clay to collect comparative ungrooved data. Contingent upon successful aerodynamic drag test results, a program will be initiated in FY78 to develop and test both ceramic and plastic millimeter radomes for missile and A/C applications.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Avionics Lab.

4.0029, ROOM-TEMPERATURE SUPERCONDUCTION IN ORGANIC SOLIDS AND BIOLOGICAL SYSTEMS

F.W. COPE, U.S. Navy, Air Development Center, *Warminster, Pennsylvania* 18974 (DN881427)

To obtain experimental evidence for superconduction in organic solids of biological origin and in living systems, and in other organic solids. This may point the way to development of room-temperature plastic superconducting wire for major reductions of size and weight of naval electrical machinery, of computers, and of sensitive magneto-detectors.

Superconduction in organic solids at high temperatures was predicted over 20 years ago, but experimental observation of this was delayed until five years ago when probable superconduction was demonstrated in the bile acids (of biological occurrence), and a probable Josephson effect was seen in carbon films at room temperature. Evidence was obtained by Cope for superconduction in living systems. Under IR project GC 157 at this laboratory,

preliminary evidence was obtained suggesting superconduction at room temperature in melanin of biological origin using new microwave methods. It is proposed to extend these preliminary studies to seek definitive evidence of superconduction in solids of biological origin and in living systems, and in other organic solids, at temperatures as high as room temperature. This may provide information regarding choice of materials for later fabrication of plastic wires which superconduct at room temperature, which may make practical the construction of naval electrical machinery of much less size and weight, because of the absence of heat generation in the superconducting wire. Superconducting computers, magnetodetectors, and microwave detectors may then also become practical, because of the removal of the need for refrigeration.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

4.0030, DEVELOPMENT OF ADVANCED AIRBORNE EXECUTIVE PROGRAM

W. POHLE, U.S. Navy, Air Development Center, *Warminster, Pennsylvania* 18974 (DN881066)

The development of new approaches for airborne executive programs. The new approaches are needed to handle federated or multiprocessor computer configurations which will be needed in the mid to late 1970's.

The approach of this effort will be to critically review project requirements and investigate alternate new approaches to the executive design. There has been little work done on multi-computer executives in the time-critical airborne environment with its associated peripheral equipment constraints. Items to be investigated are error recovery, task scheduling, processor communications and other related areas.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

4.0031, SUBSONIC WIND TUNNEL DESIGN

J.C. WESTKAEMPER, Univ. of Texas, School of Engineering, Aerospace Engin & Engin Mech, *200 W. 21st, Austin, Texas* 78712

DESCRIPTION: Detail design of the 5 x 7 ft., 200 mph open circuit wind tunnel is nearing completion, with current effort being directed toward the test section door, windows and lighting. Construction of the tunnel continues concurrently with the design effort, and completion is expected in the near future.

SUPPORTED BY University of Texas

4.0032, ENERGY CONVERSION - EVALUATION OF THE SCHLADITZ HEAT EXCHANGER AS A FUEL INJECTION SYSTEM

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The objective is to obtain accurate quantitative data relative to the Schladitz fuel injector, determining such flow parameters as pressure drop dependence of the fuel mass flow rate, particle size as an index of performance, atomization, combustor efficiency, flammability limits and quality of combustion product emissions. The effort is primarily experimental with analytical backup and is aimed at optimizing engine performance by improvement in combustion systems utilizing a variety of fuels. The research contributes to increasing the performance of aircraft, missiles and marine gas turbine engines.

Several Schladitz whisker geometries (long polycrystalline metal whiskers) in the form of a porous plug injection system will be explored and utilized in this combustion study; and suitable instrumentation will be used in determining particle size and distribution and in addition to other parameters.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

GEOSCIENCES

Includes Geosciences (general); Earth Resources; Energy Production and Conversion; Environment Pollution; Geophysics; Meteorology and Climatology; and Oceanography. For Related Information See Also Space Sciences.

5.0001, INTERPLANETARY DUST

R. PARTHASARATHY, Univ. of Alaska, Geophysical Institute, *Fairbanks, Alaska* 99701

ATMOSPHERE - To examine the formation of high-altitude (noctilucent) clouds frequently observed over Alaska in summer and the relation to tiny dust particles entering the atmosphere from interplanetary space.

SUPPORTED BY Alaska State Government

5.0002, PIONEER VENUS

H. MASURSKY, U.S. Dept. of The Interior, Geological Survey, Geologic Division, *601 E. Cedar Ave., Flagstaff, Arizona* 86001 (8-9580-01535)

Work has begun on assembling a cartographic base map of Venus from radar images acquired at the Goldstone antenna by Goldstein, Rumsey and Green in 1969, 1972 and 1973-74, and at the Arecibo antenna by Campbell, Rogers, Ingalls and Pettengill in 1969, 1972 and 1975. The landing sites of the three USSR spacecraft, Venera 8, 9, and 10, will be shown also. The low-resolution data acquired at Goldstone in 1969, 1970, and 1972, and the locations of the high-resolution data recently acquired by the same dish are shown on the index map. The resolution varies from about 10 km/PIXEL to about 100 km/PIXEL. Elevation contours will be drawn in areas covered by high-resolution images.

A nearly planet-wide geologic map will be constructed on this base. The cartographic rendition, with the geologic map overlain on it, will serve as a planning base on which the Venus Pioneer 1978 radar elevations and images will be plotted.

SUPPORTED BY U.S. Dept. of the Interior, Geological Survey, Geologic Div.

5.0003, VIKING MARS LANDER IMAGING EXPERIMENT

E.C. MORRIS, U.S. Dept. of The Interior, Geological Survey, Br of Astrogeologic Studies, *601 E. Cedar Ave., Flagstaff, Arizona* 86001 (8-9580-00757)

The cameras of two successful Viking Landers took more than 1,500 detailed photographs of the surface of Mars during the primary and extended mission. The primary mission for the Landers began at their successful landings July 20 and September 3, 1976, and ended November 5, 1976 when Mars passed behind the sun. The Landers were revived in January 1977 when Mars again became visible and acquisition of data will continue in an extended mission phase until December 1978. Lander imaging experiments will be planned during the extended mission to monitor changes in the atmospheric properties and surface features in order to better understand the seasonal changes of Mars. Imaging sequence planning meetings will be held periodically during the extended mission. Analysis of the pictures taken during the primary and extended mission will continue during FY 1978. The results will be published in scientific journals.

SUPPORTED BY U.S. Dept. of the Interior, Geological Survey, Geologic Div.

5.0004, EXPERIMENTAL INVESTIGATION OF THE RELATIONSHIP BETWEEN ATMOSPHERIC ABSORPTION AND CLOUD NUCLEUS CONCENTRATION

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Clouds are the main reflectors of incoming solar radiation and any influence of pollution on cloud reflectance has possible climatic importance. Theoretical studies indicate two opposing such influences -an increase in reflectance with pollution due to increasing drop concentration in clouds, and a decrease in reflectance with pollution due to increased absorption within the clouds. The present proposal proposes a measurement program in

which simultaneous measurements of cloud-nucleating particles and bulk particulate absorption are to be made at a field site in Southern Arizona, following which the experimentally derived data will be applied in numerical computations of cloud reflectance and of the cloud contribution to planetary albedo.

SUPPORTED BY U.S. National Science Foundation, Div. of Atmospheric Sciences

5.0005, MAGNETIC STORMS

C.F. KENNEL, Univ. of California, School of Letters & Science, Physics, *405 Hilgard Ave., Los Angeles, California* 90024 (ATM77-23139)

This grant will support a strong theoretical effort at UCLA in several areas of magnetospheric research. (a) Plasmaspheric Interactions: R.M. Thorne in collaboration with several students will complete the theoretical simulation of ELF plasmaspheric hiss, and make a detailed comparison of the theoretical results with hiss observations. This effort promises to yield a comprehensive understanding of wave-particle interactions inside the plasmasphere. An immediate consequence will be an accurate modeling of the precipitation of energetic electrons into the mid-latitude ionosphere. (b) Electrostatic Electron Cyclotron Waves: M. Abdalla and C.F. Kennel will extend the instability analysis of electrostatic cyclotron waves to determine under what plasma conditions waves can be excited. An understanding of when multiple cyclotron harmonics can be excited may lead to an important diagnostic for the cold plasma density. (c) Ring Current Dynamics: Dr. Cornwall will continue his work on ring currrent dynamics using the quasilinear moment-transport relations. He will study the inward transport of energetic ring current protons by radial diffusion and the wave turbulent relaxation of the proton anisotropy produced by the cross-field diffusive transport. (d) Auroral Arc Plasma Physics: Dr. J. Maggs will study the production of terrestrial kilometric radiation. He and C.F. Kennel will investigate the possibility that the precipitating auroral electron beam can generate intense electrostatic noise at the upper hybrid frequency. (e) Reconnection and Substorms: Drs. F.V. Coroniti and M. Abdalla will study the nonlinear development of the tearing instability when it reaches the nonlinear ion tearing regime. Drs. F.V. Coroniti and C.F. Kennel will incorporate the tearing mode reconnection ideas into a model of substorms. The aim is to answer the basic question, when and where does magneto tail reconnection occur during substorms?

SUPPORTED BY U.S. National Science Foundation, Div. of Atmospheric Sciences

5.0006, THE FORMATION AND DISSIPATION OF COASTAL FOG

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The objective of this research project, which began in 1974 under a two-year grant from the NSF, is to study the micrometeorological and microphysical characteristics of the advection fog occurring on the San Francisco peninsula. This work is carried out from the Mt. Sutro TV tower which is sufficiently tall to penetrate the marine inversion layer. It has been found: (1) that despite large differences in the synoptic scale features, the microphysical development of the fog in each case was quite similar and (2) that the marine air inversion interface plays a crucial role in drizzle development by supporting both radiational cooling and mechanical mixing processes.

During the next grant period special attention will be paid to the above processes and their relative importance to the maintenance of the stratus structure. These investigations will be supported by additional measurements of liquid-water content and visibility. A series of experiments using fluorescent particles released by aircraft upwind from the tower site will be carried out to determine the flux across the inversion.

SUPPORTED BY U.S. National Science Foundation, Div. of Atmospheric Sciences

5.0007, USE OF ENVIRONMENTAL SATELLITE DATA FOR ENERGY BALANCE SNOWMELT MODELING

J. DOZIER, Univ. of California, School of Letters & Science, Geography, *Santa Barbara, California* 93106 (7-862; 04-8-M01-78)

The objective is to use data (visible and thermal) obtained from sensors onboard the NOAA-5 and TIROs N environmental satellites to derive a number of parameters necessary for driving and calibrating an energy balance snowmelt model.

The approach will be to use NOAA satellite data on Computer Compatible Tapes to supplement or replace in situ data as the input to various energy balance models. Specifically, satellite data will provide information pertaining to cloud heights and cloud temperatures, major input data for a cloud radiation model, with the potential of leading to a model based exclusively on satellite data. Albedo measurements based on the remotely collected data will provide another necessary input variable for the overall energy balance snowmelt model. Input to an existing atmospheric radiation model, using satellite thermal data, will be studied to see if the satellite data can more accurately measure surface temperature while also providing atmospheric radiation over snow. Separation of surface radiance from atmospheric radiance will be attempted using surface temperature measurements for calibration. Positive findings will permit direct use of satellite data as input into the energy balance snowmelt model.

Surface-calibrated thermal data will also be used in an attempt to monitor changes in the areal extent of isothermal snow. Such changes are related to potential snowmelt runoff. Visible data of late spring snowfields will be examined to determine areal extent and possibly the depth of the snow.

Differences in surface temperatures obtained from satellite-acquired data and those derived from a primitive model will be examined to assess the potential to estimate heat transfer due to katabatic winds.

SUPPORTED BY U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., National Environmental Satellite Service

5.0008, NAVY ENVIRONMENT - AERO-RADAR ICE SENSING

R.D. WORSFOLD, Memorial Univ. of Newfoundland, Ctr. for Cold Ocean Reso. Eng., *Health Science Complex, A1c 5S7, St. Johns, Newfoundland, Canada* (DN875009; N00014-77-G-0036)

The objective is to determine the relationships between various multi-frequency radar channels and their use in interpreting sea ice, icebergs, and the ocean environment off the northeastern coast of Canada. The second goal is comparison of the obtained radar data with data from other sensors that will be flown over the ground truth stations. Some of these sensors will also be on SEASAT-A, therefore, investigators will be able to study data that will be similar to the total data package of SEASAT-A.

The four-channel, x and l-band synthetic aperture radar operated by the Environmental Research Institute of Michigan will be rented and flown over various ice types. Ground truth stations will be established. All data will be available on magnetic tape. Data will be processed and comparative analysis between x and l band imagery at various frequencies, look angles and polarizations accomplished.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0009, HURRICANE STUDIES

S.L. ROSENTHAL, U.S. Dept. of Commerce, Environmental Research Labs., *Boulder, Colorado* 80302 (8C350221)

PROJECT OBJECTIVE: 1. Analyze wind fields in hurricanes in relation to eye-diameter central pressure and storm size. 2. Analyze synoptic data in relation to problem of evaluating possible chain of events determining hurricane intensity.

CURRENT YEAR PLAN: 1. To investigate wind speed profiles and eye-diameter as a function of central pressure depth and functional drag. 2. Complete synoptic scale study of events associated with the intense deepening of hurricane Eloise. Also, complete study of synoptic and mesoscale events of hurricane Gloria.

PROGRESS REPORT: 1. Work has begun on solution of governing equations as expressed by Kuo. 2. Analysis of wind data for 4 days of Eloise case is completed. A computer program to analyze this data is completed and results are being studied. Upper and lower level data from aircraft, satellite and ships have been collected for the Gloria study.

SUPPORTED BY U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., Environmental Research Labs.

5.0010, THE MOVABLE FINE-MESH (MFM) ANALYSIS-PREDICTION SYSTEM

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OBJECTIVE: To improve guidance for landfall forecasts for tropical storms and to develop improvements for prediction of significant precipitation events.

STATUS: The Movable Fine-mesh Model (MFM) is functioning as an on-call model for both operational hurricane forecasting and possible flooding situations. Results from 3 years of operational running show improvements over other objective techniques for both phenomena.

Limited testing with three analysis systems indicate that the model is extremely sensitive to initial conditions, so much so that operational analysis errors, encountered occasionally, can significantly reduce the reliability of the forecast results. This result, coupled with the impending operational availability of improved aircraft and satellite wind data, suggests that top developmental priority be given to initializing models in the coming year.

PLANS FOR FY78: (1) Higher-resolution analysis will be attempted to better establish the symmetric structure of tropical storms run on the MFM. Experimental data obtained from satellite and reconnaissance aircraft will be interpolated to grid points with heavy reliance placed on structure statistics of model storms. Analyses thus obtained will be modified to insure dynamical consistency by the use of the model forecast equations. (2) Tests with the isentropically derived MFM analysis will be carried out to determine whether or not the system is ready for operational implementation in its current form. (3) A diagnostic study, aimed at establishing the budgets of physical parameters during integrations will continue. Sources of numerical as well as conceptual errors in the model are the primary targets of this study. (4) More general moisture physics linked to a reasonable diurnal radiation cycle will be studied in an attempt to simulate sub-grid scale precipitation better. (5) The computer codes will be further generalized to allow for easy changes in grid points in the horizontal and number of layers in the vertical. Codes will be changed to allow the model to be used in the Southern Hemispheric tropical zones as well as in the Northern Hemisphere. Fourth-order differencing options will also be added to the programs. (6) Comparative tests will be performed in data-rich regions to determine advantages and disadvantages of the MFM relative to the new operational models.

Part 2 of 7.

SUPPORTED BY U.S. Dept. of Commerce, National Weather Service, National Meteorological Center

5.0011, GRAVITY FIELD IMPROVEMENTS

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AF function - weapon systems navigation, guidance and delivery. Deficiency - launch site, target position and geoid uncertainties degrade accuracy of weapon delivery. Objective - ability to use most up-to-date computational developments for gravity field determinations. How research contributes - contractor will study computation methods for gravity from satellite altimetry.

A multi-branched study of computational methods will be directed toward use of the most up-to-date techniques for gravity field determinations.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0012, NAVY ENVIRONMENT - BEACH-INLET TRANSITIONAL ENVIRONMENT

R.A. DAVIS, State University of Fla. Sys., School of Natural Sciences, Geology, *4202 E. Fowler Ave., Tampa, Florida* 33620 (DN775283; N00014-77-C-0151)

The objective of this study is to resolve the nature and extent of the transitional zone between tide-dominated inlet environments and wave-dominated adjacent beach environments, and to assess the feasibility of a long-term comprehensive modeling study of this transitional zone. An inlet can cause significant perturbations on adjacent nearshore environmental parameters and thereby degrade the quality of environmental predictive models employed in support of Navy/Marine Corps coastal operations.

Two short field investigations will be conducted at Johns Pass and Matanzas Inlet on the coast of Florida in early CY 77. Parameters to be monitored include wind speed and direction, wave height and period, wave direction and near shore orientation, tidal currents, longshore currents, and water level. Detailed surveys of bathmetry and coastal morphology will be made. Waves and longshore currents will be measured at multiple locations on both sides of the inlet several times during the experiment. Other inlets will be studied through the use of aerial and satellite imagery and existing data sets.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0013, THE EVOLUTION AND TRANSPORT OF IONS IN ATMOSPHERIC GASES

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The transport and reactions of ions are important in the overall chemistry of the atmosphere and also in the electrical behavior for they are the basis of the atmospheric conductivity. This research will involve measurements on the transport properties and chemical reactions of ions in gases to atmospheric pressure. Measurements will be made with a drift tube mass spectrometer which is designed to allow accurate measurements from low pressures up to 1,500 torr (2 atmospheres). Such an instrument is available commercially under the name 'Plasma Chromatograph.' The proposed program of research will improve our understanding of ionic chemistry in the gas phase, and will provide much data for use in studies of the earth's lower atmosphere.

The research will extend studies of ions produced from previously studied gases such as oxygen, nitrogen, hydrogen and carbon monoxide to higher pressures, with the expectation of finding new ionic species produced by ion-molecule reactions which are insignificant at low pressures. In addition, the work will study transport and chemical reaction properties of ions produced from such environmentally important gases as CO, SO2, NO2, O3, NO, H2S, and CO2 in nitrogen, oxygen and oxygen-nitrogen mixtures, and the mobilities of the negative halogen ions Cl-, Br-, and F- in the noble gases. At elevated temperatures the work will make a direct test of the Viehland-Mason theory of ionic transport. This new theory allows measurements of ionic mobilities performed at room temperatures as a function of electric field strength to be interpreted as the zero-field values as a function of the effective ion-gas temperature.

SUPPORTED BY U.S. National Science Foundation, Div. of Atmospheric Sciences

5.0014, INTERPRETATION METHODS FOR LARGE-SCALE MORTALITY PHOTOGRAPHY

R. HELLER, Univ. of Idaho, Forest Wldlfe. Exp. Station, *Moscow, Idaho* 83843 (0074662; IDA-ES-0137)

OBJECTIVE: Interpret 70mm color aerial photographs taken over three northern Idaho National Forest for current tree mortality, tree species, and crown diameter. Produce a manual of written instructions for recognition of annual tree mortality.

APPROACH: Following training and ground visits for tree species identification, tree photo interpreters have made necessary measurements on furnished aerial photography. An outline for the Manual of Instructions has been prepared and tested. Writing is underway.

SUPPORTED BY Idaho State Government

5.0015, LONG PERIOD TERMS IN THE UPPER ATMOSPHERIC AIR DENSITY
A. EISNER, Johns Hopkins University, Applied Physics Laboratory, *Johns Hopkins Rd., Laurel, Maryland* 20810 (ATM77-21020)

This grant funds a new method, employing satellite along-track position errors, to obtain information on atmospheric densities at altitudes of 900-1200 km. Daily tracking results from the Navy Navigation Satellite System (NNSS) comprise the data base utilized.

Densities derived from this data (for the years 1974-1976) show a pronounced semiannual variation with the April/October maxima exceeding the August/January minima by factors of 2-4. The variation is more pronounced than was previously reported and double the best current modeled variation. The current resolution with this technique is on the order of 1 x 10 to the minus 19th power gm/cubic cm or about 10 percent of the total density at these altitudes.

This data is to be utilized to obtain proved models of these long period density variations.

SUPPORTED BY U.S. National Science Foundation, Div. of Atmospheric Sciences

5.0016, SOLAR RADIO SIGNATURES OF HIGH ENERGY PROTONS
W.R. BARRON, U.S. Air Force, Geophysics Laboratory, *L.G. Hanscom A.F.B., L.G. Hanscom A.F.B., Bedford, Massachusetts* 01730 (DF580860)

AF function - communications, surveillance and navigation. Deficiency - prediction of interruptions to communications, false claims in surveillance systems from natural causes and navigation errors due to insufficient signatures of solar particle and electromagnetic radiation. Objective - develop and interpret the relationship between solar radio burst parameters and high-energy protons. How research contributes -provides prediction of proton flux spectrum characteristics.

It has been shown that the flux of high-energy (greater or equal to 10 MeV) protons is correlated with microwave burst integrated flux density. The superiority of one frequency over another for this purpose is not well established. The approach is to analyze proton events from 1966-1976 to determine the best radio frequency, if any, for proton prediction, and if there is no single best frequency, to develop a prediction algorithm based on the burst integrated flux density over several bands in the 1,000 to 10,000 mHz range.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0017, STRATOSPHERIC EDDY DIFFUSION COEFFICIENTS FROM WIND MEASUREMENTS
E.M. DEWAR, U.S. Air Force, Geophysics Laboratory, *L.G. Hanscom A.F.B., L.G. Hanscom A.F.B., Bedford, Massachusetts* 01730 (DF581140)

AF function - environmental impact assessments. Deficiency -problem area stratospheric pollution and the lack of understanding concerning what happens to pollution deposited there and how long it takes for the pollution to be removed. Objective - the goal of this work is to convert field experiment data into parameters describing vertical motion of contaminants which would help to estimate rate of pollution removal by turbulence. How research contributes - at present there is a gap in our information concerning the dynamical behavior of the stratosphere in connection with pollution impacts there. This research will contribute by uncovering the effects of turbulent mixing so that better environmental impact assessments may be made of AF operations. In particular, turbulent mixing may play a significant role in stratospheric chemistry as well as in stratospheric residence times. The end product of this research will be estimates of the so-called eddy diffusion coefficient.

Experimental data will be employed from in-house rocket and balloon measurements as well as contractual work involving radar measurements. This data will be analyzed with the help of theoretical models to calculate eddy diffusion coefficients. Gaps in the experimental data inventory will be identified and thus provide guidance for the experimental field program. Factors that may impede progress are (a) unavailability of programming help, (b) unexpected encounters with information gaps which can be discovered only when met during the actual carrying out of this task.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0018, SWIR SURVEY OF LOW-PRESSURE AIR EXCITED BY ELECTRONS
A.R. FAIRBAIRN, U.S. Air Force, Geophysics Laboratory, *L.G. Hanscom A.F.B., L.G. Hanscom A.F.B., Bedford, Massachusetts* 01730 (DF580330)

AF function - detection, surveillance, early warning, reconnaissance, target acquisition. Deficiency - optical and infrared background fluctuation interfere with and degrade the performance of detection systems, auroral events of nuclear detonations contribute strongly to the background fluctuations. The chemical and physical effects of these phenomena, which deposit electrons in the upper atmosphere, are not well enough understood to allow proper connection to be applied to sensor outputs to eliminate or minimize the interference. Objective - to survey the short wavelength infrared radiation emitted by low-pressure air impacted by electrons. How research contributes - will provide inputs to IR background predictive codes for IR detection.

Atmospheric gases in the pressure range 0-0.1 torr will be excited by low-energy (0 to 10 Kev) electrons in a large cooled background to suppress competing background radiation and enhance signal-to-noise ratios. Primary observations will be in the 105 micron wavelength regions with particular reference to NO emission at 2.7 and 5.3 micrometers.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0019, DEVELOPMENT AND EVALUATION OF COMPREHENSIVE DYNAMIC ATMOSPHERIC MODEL
D. GILLETTE, U.S. Air Force, Geophysics Laboratory, *L.G. Hanscom A.F.B., L.G. Hanscom A.F.B., Bedford, Massachusetts* 01730 (DF581250)

AF function - orbital navigation, orbital surveillance. Deficiency - ephemerides of operational satellites cannot be computed accurately due to lack of knowledge of spatial and time variations of density at critical altitudes. Objective - development of a multi-constituent three dimensional dynamical model of the thermosphere. How research contributes - new model can be recommended for use by COESA in the development of revised US standard atmosphere supplements and by the NORAD Cheyene Mountain Space Computation Center for ephemeris computations.

A data base of all available density, composition, temperature, and other structure measurements, and appropriate solar-geophysical parameters must be constructed. Current observational and theoretical data existing in the literature will be studied to determine appropriate functional dependencies and degree of complexity to represent variations in each of the constituents. Defining constants associated with these functional forms will be determined in least-squares sense by fitting the satellite, rocket and/or ground based measurements. Method of interpolating between least-squares representations at discrete height intervals must be developed. Tests will be conducted to evaluate model performance.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0020, STATISTICAL SPECIFICATION OF CLOUD COVER AND PRECIPITATION
T.J. KEEGAN, U.S. Air Force, Geophysics Laboratory, *L.G. Hanscom A.F.B., L.G. Hanscom A.F.B., Bedford, Massachusetts* 01730 (DF581500)

AF function - weather observing, analysis and forecasting for military operations. Deficiency - lack of adequate information to meet military weather support requirements. Objective - to develop statistical relationships for the specification and predic-

tion of total cloud amount and precipitation, based primarily on geosynchronous meteorological satellite data. How development contributes - successful development of these techniques will allow automated forecasts of cloud and weather conditions at many locations, satisfying AWS requirements specified in AWS TN 3-76.

A collection of GOES satellite video and IR data for northeast U. S. for the period March 77-March 78 will serve as a data base. Comparisons of satellite video and IR values around major aviation weather stations will be made with reported weather conditions and algorithms developed to specify and predict for up to six hours the probability of occurrence of cloud and weather conditions. Efforts will be made to ensure accurate navigation, and corrections will be made for varying sun angle. Emphasis will be on the warmer regions and month to avoid difficulties in discriminating between snow-cover and cloudiness, which is the subject of IHWU 76700903.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0021, RELATIVE DURATION OF SPORADIC E VERSUS DISCRETE EVENTS

P.A. KRUKONIS, U.S. Air Force, Geophysics Laboratory, *L.G. Hanscom A.F.B., L.G. Hanscom A.F.B., Bedford, Massachusetts* 01730 (DF580980)

AF function - communication, radar, navigation and surveillance. Deficiency - the polar ionosphere is presently very unpredictable to such a degree that the above functions are frequently degraded or crippled. Objective - to define the durations of discrete auroral events via sporadic e. How research contributes - the ionospheric environment affects AF ground and airborne communications and surveillance systems. Accurate specification of the relationship of the interaction of ionospheric sporadic e and auroral temporal and spatial effects will contribute to the reliable operation of the AF communication and surveillance functions.

Gather and interpret ionosonde sporadic e data collected on selected flights of the AFGL airborne ionospheric observatory, NKC-135 aircraft number 53131, from the AFGL Goose Bay Ionospheric Observatory and other ground-based ionospheric stations. Analyze related ASCA photographs for duration of short-term auroral activity. Investigate relationship between duration of discrete auroral events and sporadic e to model temporal and spatial changes between 'anchor-point' determinations of e-region characteristics.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0022, HEAO-C THEORETICAL STUDIES

D.F. SMART, U.S. Air Force, Geophysics Laboratory, *L.G. Hanscom A.F.B., L.G. Hanscom A.F.B., Bedford, Massachusetts* 01730 (DF580750)

AF function - communications and detection. Opportunity - geomagnetic field models are used to predict effects important to a number of USAF communication and detection systems. The HEAO-C satellite (to be launched in 1980) will provide a unique, hitherto unavailable opportunity to check the absolute accuracy of mathematical models of the magnetic field in the magnetosphere by comparing the calculated effects of the magnetic field on energetic charged particles with the forthcoming experimental measurements. Objective - to perform theoretical studies of the energetic charged particle access through the inner magnetosphere where the internal geomagnetic field dominates. These studies are to be conducted within the framework of the expected observations to be available from the HEAO-C satellites. How research contributes - the results to be obtained are the calculations that must be made prior to satellite launch in order to have the theoretical predictions that can be compared with the satellite measurements to be obtained.

There are specific detailed characteristics of energetic charged-particle access to the geomagnetic field that have been theoretically predicted but have never been experimentally measured because the experimental resolution has not been adequate. The planned observations from the HEAO-C satellite are expected to have sufficient detail in resolution to measure these effects. The primary technical 'tool' to be utilized in this research effort is the high-speed digital computer. In this effort, numerical calculations of energetic charged particle access into the domain controlled by the geomagnetic field will be made for selected positions for the HEAO-C satellite orbit as defined by geographic latitude, geographic longitude, and altitude. Utilizing a current model of the quiescent geomagnetic field, such as the international geomagnetic reference field, numerical results for a sufficient number of directions and locations for a satisfactory description of the structure expected in the access of energetic charged particles to the satellite are to be derived. The numerical results are to be completed before the satellite is launched in 1980.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0023, UPGRADING THE MILLSTONE HILL RADAR FOR INTERNATIONAL MAGNETOSPHERE STUDIES

J.V. EVANS, Mass. Inst. of Technology, Lincoln Laboratory, *244 Wood St., Cambridge, Massachusetts* 02173 (ATM77-19635)

This grant funds further upgrading of the Millstone Hill incoherent scatter radar. These funds will allow a variety of improvements to be made to the new 150-foot antenna. Specifically they will permit 1) the installation of means for controlling the antenna pointing via the computer, and 2) moving the antenna in azimuth and elevation simultaneously (currently the available electricity supply will allow motion in only one axis at a time). In addition, these funds will allow a significant upgrading of the sensitivity of the radar through the purchase of a new receiver parametric amplifier that will be mounted on the antenna. Finally, it is planned also to upgrade the data taking capability of the radar by means of an array processor which will serve as a flexible fast multiplier preprocessor for the XDS 930 computer.

This device will relieve the computer of the burden of calculating correlation coefficients in those experiments where multiple short pulses are transmitted and will allow higher sample rates (radar pulse repetition frequencies) and/or more range gates to be handled. (This capability will be of great benefit for possible studies of clear-air returns from the stratosphere and troposphere as well as the incoherent scatter program.) This work should be completed in time to impact the International Magnetospheric Study (IMS) effort.

SUPPORTED BY U.S. National Science Foundation, Div. of Atmospheric Sciences

5.0024, WEATHER RADAR ECHO ASSESSMENT AND FORECAST

R.K. CRANE, Environmental Res. & Tec. Inc., *696 Virginia Rd., Concord, Massachusetts* 01742 (DF581750; F19628-78-C-0076)

AF function - protection of aerospace systems in severe storms. Deficiency - identification and warning of storm hazard by current methods are unreliable and require ineffective utilization of projected reduced manpower. Objective - to develop software suitable for the operational detection of meteorologically significant features of storms and the prediction of storm movement, development, and severity. How development contributes - provides improved identification and prediction of convective storm hazards using automated data processing techniques for storm diagnosis.

Algorithms for detecting radar indicators of severe weather phenomena will be developed based on radar data taken in Oklahoma during the joint agency Doppler tests in the spring of 1977. The algorithms will be operationally tested during the spring 1978 test and modified based on the test results.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0025, CLIMATIC MISSION SUCCESS INDICATORS

D.E. MARTIN, St. Louis University, School of Engineering, Earth & Atmospheric Sciences, *3507 Laclede Ave., St. Louis, Missouri* 63103 (DF248330; F19628-77-C-0032)

AF function - direct support of SAMSO infrared measurements program. Deficiency - lack of knowledge of rocket attitude

control and behavior. Objective - to provide the Air Force with a reliable, highly accurate attitude control system for ARIES sounding rockets. How research contributes - provides rocket-borne payloads with sufficiently accurate attitude control for probing the infrared aerospace environment.

Develop and fabricate a state-of-the-art, highly accurate attitude control system for the ARIES rocket.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0026, NAVY ENVIRONMENT - PREDICTION OF OCEAN TIDES WORLDWIDE

J.T. KUO, Columbia University, Lamont Doherty Geolog. Observ., *Palisades, New York* 10964 (DN223188; N00014-75-C-0605)

This research is to predict ocean tides at any point in the world's oceans, with emphasis on accurate predictions along shorelines. Tides and tidally induced currents significantly affect amphibious operations, mining implants, ship routing, sea floor construction, and ship operation in shallow coastal waters; produce internal waves and significant currents even in the open oceans where they impact submarine operation as well as acoustic propagation.

The experiment consists of constructing and installing several tide measuring packages each including a gravimeter, pressure sensor, current speed and direction indicators mounted in sphere capable of withstanding pressures in the deepest oceans, capable of recording for six months. Ocean tidal height is measured at each point. In addition, the change in gravitational potential is observed. This is caused by tidal displacement of both the ocean and the earth in a broad cone of influence about the station. By establishing a network of shore and ocean bottom stations, ocean tides can be inferred for all significant components using only a few ocean stations. Further, these data will be extended using radar altimeter data from the GEOS-C satellite.

ADDENDA: Supporting agency address is: Office of Naval Research, Arlington, VA 22217

SUPPORTED BY U.S. Dept. of Defense, Navy

5.0027, GENERATION OF VORTICES AT A FREE SURFACE

R.F. GANS, Univ. of Rochester, School of Arts & Sciences, Aerospace & Mech Science, *260 Crittenden Blvd., Rochester, New York* 14627 (ATM76-05043 A01)

The fluid is a partially filled, horizontally rotating cylinder exhibits various unexpected behavior. Explanations of this behavior are at best tentative. To explain the observed behavior, measurements of azimuthal velocity near the interface and in the body of the fluid are required. A laser Doppler anemometer will be used to obtain these measurements. With these measurements, the theoretical explanation will have a greater change of relating the laboratory phenomena to a similar natural phenomenon--the generation of secondary cyclonic storms.

SUPPORTED BY U.S. National Science Foundation, Div. of Atmospheric Sciences

5.0028, GAS WELL FRACTURING IN THE DEVONIAN SHALE OF OHIO

F.D. RYAN, Amex Vescorp, *Worthington, Ohio* (E(40-1)-5253)

The objective of this field test consists of three parts: (1) to determine the effectiveness of remote sensing imagery as a tool to optimize well locations in the Devonian Shale; (2) to determine the relative effectiveness and quantitative benefit of foam fracturing and cryogenic fracturing to increase gas-well-production rates and reserves in the Devonian Shale; and (3) to determine if scaled-up versions of the better of the two types of treatments (foam or cryogenic fracturing) are cost-effective techniques for improving gas-well-production rates and reserves in the Devonian Shale. (BERC-77/1)

SUPPORTED BY U.S. Dept. of Energy, Morgantown Energy Research Center

5.0029, INTERDISCIPLINARY APPLICATIONS AND INTERPRETATIONS OF REMOTELY SENSED DATA

G.W. PETERSEN, Penn. State University, Agric. Experiment Station, Agronomy, *201 Shields Bldg., University Park, Pennsylvania* 16802 (0071504; PEN02289)

OBJECTIVE: Develop techniques for the processing, interpretation and analysis of remotely sensed data collected by aircraft and spacecraft.

APPROACH: Remotely sensed data collected by aircraft and satellite will be interpreted by a multidisciplinary team. Imagery and digital data will be analyzed using conventional airphoto interpretation techniques as well as automatic data processing techniques. Emphasis will be placed on the following areas: Soil mapping, forest inventory, strip mining, land use, crop yield predictions and geology. Multi-spectral and multi-date data will be used.

SUPPORTED BY U.S. Dept. of Agriculture, Cooperative State Research Service, Pennsylvania

5.0030, REMOTE SENSING TECHNIQUES FOR WATER RESOURCE PREDICTION AND MANAGEMENT

B.J. BLANCHARD, Texas A & M University System, Agric. Experiment Station, Agricultural Engineering, *College Station, Texas* 77843 (0072159; TEX06252)

OBJECTIVE: Select and evaluate appropriate remote sensing devices and techniques for use in measuring watershed parameters associated with watershed runoff prediction models. Develop improved watershed runoff models based on remote sensing measurements.

APPROACH: Existing and newly developed systems in remote sensing will be studied to determine the applicability of each system for measuring or mapping either single parameters, such as soil moisture, land use, etc., or combined parameters represented by watershed runoff coefficients. Results of these tests will be used to develop watershed runoff models using remote sensing data as input. The new models will then be tested on measured watersheds to demonstrate their applicability.

SUPPORTED BY U.S. Dept. of Agriculture, Cooperative State Research Service, Texas

5.0031, REMOTE SENSING OF SNOW WATER EQUIVALENT AND SOIL MOISTURE (PART 1)

C.J. HOSIE, Plessey Radar, Research Centre, *Southleigh Pk. Hse. Eastleigh, Po0 2PE, Havant, England, United Kingdom* (172327 (HRB NO.))

The aim of this study is to assess the feasibility of remote sensing of snow water equivalent (SWE) using natural gamma radiation from the ground. Detailed ground measurements are being taken and a program of airborne measurements is currently being planned. Carefully controlled ground measurements have indicated that the remote sensing of SWE and soil moisture using this technique is feasible. Comprehensive airborne measurements are required to calibrate equipment in order to produce a working airborne system. /IRRD/IRF/

SUPPORTED BY Dept. of the Environment

5.0032, REMOTE SENSING/WASTE DISPOSAL

L.C. ROWAN, U.S. Dept. of The Interior, Geological Survey, Geologic Division, *12201 Sunrise Valley Dr., Herndon, Virginia* 22092 (9790-02015)

STATES TO WHICH PROJECT PERTAINS: Utah, Maine, New York, South Dakota.

Emphasis will continue to be placed on the regional structural framework for each of four areas: the Paradox Basin, Utah, the Orland lineament, Maine, Salina Basin, New York, and the Pierre Shale, South Dakota. Landsat images recorded during different seasons of the year will be enhanced using various computer algorithms aimed at displaying surface manifestations of structural features; Skylab and high-altitude photographs will also be analyzed where they are available. Lineaments and other structurally pertinent data will be digitized for comparisons with geologic and geophysical data. Detailed field studies will be conducted during the latter part of the fiscal year.

SUPPORTED BY U.S. Dept. of the Interior, Geological Survey, Geologic Div.

5.0033, A STUDY OF STRATOSPHERIC AEROSOL SOURCES, FORMATION PROCESSES AND ROLE AS A SINK FOR TRACE GASES
D.J. HOFMANN, Univ. of Wyoming, School of Arts & Sciences, Physics & Astronomy, *P.O. Box 3435, University Station, Laramie, Wyoming* 82071 (ATM77-27552)

This action funds the study of the nature and importance of the stratospheric sulfate aerosol layer in terms of defining the source, investigating aerosol formation processes and investigating the importance of transport processes. These research goals will be sought by conducting stratospheric balloon soundings of ozone, r greater than or equal to 0.15 micron aerosol r greater than or equal to 0.01 micron condensation nuclei and be observing the vaporization point of the volatile aerosol in the sulfate layer over Laramie, Wyoming. Major emphasis will be placed on continuing monthly aerosol soundings at Laramie as have been done in the past year, to attempt to sort out volcanic and transport effects. In studying transport phenomena, ozone measurements are important as another tracer of equatorial air. Laboratory studies of ozone sensors will continue in hopes that a chemiluminescent detector can be suitably calibrated prior to balloon launch so the absolute as well as relative ozone data can be obtained. Continued research on the condensation nuclei counter is necessary to improve its high-altitude response. Some of this work should be done this summer along with additional aerosol vaporization measurements. To increase the versatility of balloon platforms for stratospheric research, work will proceed on developing small multi-balloon systems wherein the number of balloons is varied to obtain different float altitudes and developing radio command capabilities so that the experimenter can control his experiment from the ground. Related work funded by the Office of Naval Research and the Army Research Office will be coordinated with this effort.

SUPPORTED BY U.S. National Science Foundation, Div. of Atmospheric Sciences

LIFE SCIENCES

Includes Life Sciences (general); Aerospace Medicine; Behavioral Sciences; Man/system Technology and Life Support; and Planetary Biology.

6.0001, AIR FORCE SKILLS MAINTENANCE AND REACQUISITION TRAINING RESEARCH PROGRAM PLANNING AND MANAGEMENT
E.E. EDDOWES, U.S. Air Force, Human Resources Laboratory, *Williams A.F.B., Chandler, Arizona* 85224 (DF223960)

Develop and validate comprehensive, quantitative, objective procedures which will permit the Air Force to manage an individualized flying training program which will provide acceptable mission readiness at minimum cost. This work unit will document the planning and management of the Air Force Skills Maintenance And Reacquisition Training research program (project SMART).

The objective of this research will be achieved through the sequential accomplishment of the following four phases: 1. Identify and operationally define the critical, higher-level flying skills required to maintain mission readiness. 2. Develop and evaluate operationally acceptable, practical means for measuring the critical mission readiness skills. 3. Measure the retention of mission readiness skills as a function of the duration of non-flying periods. 4. Evaluate the effectiveness of alternative flying training programs designed to maintain or foster rapid reacquisition of mission readiness skills.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

6.0002, ADVANCED CIG DATA BASE DEVELOPMENT ANALYSIS
E.G. MONROE, U.S. Air Force, Human Resources Laboratory, *Williams A.F.B., Chandler, Arizona* 85224 (DF223760)

To enchance the capability of the advanced simulator for pilot training by providing the capability to generate and visually verify the computer image generation (CIG) data base in the off-line mode. In addition, analyses of visual data base structures and advanced software algorithms will be performed. This will provide a broader base for behavioral research and facilitate man-machine interaction.

This effort will develop an automated approach to the generation of CIG visual data bases primarily through the development of software facilitating programs and the addition of interactive computer graphics equipment. The software will be used to generate and verify visual data base material in the off-line mode through the use of the interactive graphics equipment. The first step is to complete the software to generate the visual data base. The second step is to install the computer graphics equipment and the third step is to complete the software for data base verification.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

6.0003, DEVELOPMENT OF NEUROPHYSIOLOGICAL AND BEHAVIORAL METRICS OF HUMAN PERFORMANCE
S.L. MOISE, Univ. of California, School of Medicine, Anatomy, *405 Hilgard Ave., Los Angeles, California* 90024 (DF046490; AF-AFOSR-3184-77)

AF function - identification of a target imbedded in a field of decoy targets is both an offensive and a defensive problem of high Air Force interest. Deficiency - there is no well-defined literature on clutter analysis although it impinges upon pattern recognition, visual noise, masking, and decision making. No systematic evaluation of clutter factors required for optimal observer confusion is available. Objective - the purpose of these studies is to provide basic data for several applied optical countermeasure programs. How research contributes -these studies contribute directly into the optical countermeasure program documented in the AMD plan under project 7184 supporting AFSC development goals SO-3, SO-4 and TW-9.

Since many clutter factors are present and interact in any clutter situation, 3-dimensional matrixes with axes corresponding to number of elements in the clutter, contract ratios and movement patterns will be constructed based on systematic covariance of each factor.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

6.0004, NAVIGATION TRAINING FOR TERRAIN FLIGHT
O.A. LARSON, U.S. Navy, Personnel Res. & Dev. Center, *San Diego, California* 92152 (DN797567)

To develop a program for training Marine Corps helicopter pilots in techniques that will allow them to fly over unfamiliar terrains under a wide variety of environmental conditions.

Map interpretation and terrain analysis techniques will be developed and evaluated. Flight navigation problems specific to USMC operational requirements will be developed, analyzed, and recommenda-tions made. Materials and methods will be field-tested.

SUPPORTED BY U.S. Dept. of Defense, Navy, Personnel Research & Development Center

6.0005, PERFORMANCE LIMITS IMPOSED BY VESTIBULAR RESPONSES IN MOVING MILITARY SYSTEMS
F.E. GUEDRY, U.S. Navy, Aerospace Medical Res. Lab., *Pensacola, Florida* 32512 (DN740703)

To specify limiting conditions of vestibular responses on performance in moving military systems as influenced by individual differences, adaptive training, physiological state, and visual display characteristics.

Visual performance, information processing, oculomotor responses, autonomic responses and perceptual and psychomotor performance are measured during simple and complex combinations of angular and linear accelerations simulating elements of military motion environments. The effects of modifying factors

such as lighting, display layout, fatigue, alcohol, practice on response systems integral to man's control of motion are evaluated with a view to operational relevance.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Aerospace Medical Research Lab.

6.0006, HIGH Q WINDBLAST FORCES ON MAN
L. SPECKER, Payne Incorporated, *Annapolis, Maryland* (DF323000; F33615-77-C-0523)

The forces acting on the ejecting crewman entering the windstream during emergency escape are the second most frequent major cause of all injuries experienced during ejection. Injuries attributed to windblast flail are encountered in 5.6 to 6.9 percent of all survived ejections, while 54 percent of ejections in the 450 to 600 KEAS range result in major injuries or fatalities. As the performance envelope of advanced aircraft systems is expanded, windblast injuries will probably become more common. With the advent of the newer bubble canopies, windblast forces are encountered before the crewman is clear of the aircraft. The data that have been collected on crewmen during emergency escape have been limited to that portion of the escape sequence in which the crewman was exposed to free-stream conditions. One-ninth scale model wind-tunnel tests of the F-16 aircraft have indicated that the environment within the cockpit before entry into the high-speed windstream is potentially hazardous. The aerodynamic forces are increasing in magnitude and the turbulence levels encountered may seriously compromise the crewman's chance of survival before rescue. The objectives of this program are to provide measurements of the aerodynamic forces that are encountered during the initial and transitory phases in the turbulence about the cockpit in order that effective protection countermeasures can be developed.

The program will combine an analytical effort with a wind-tunnel scale study. The model will be used to collect pressure and force data needed to quantify inertial and aerodynamic forces acting on the ejecting crewman to cause injury and the development of requirements for the design of personnel protection systems. The analytical effort will allow for the analysis of the wind tunnel data as well as exploring the use of various testing facilities and techniques for windblast research.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Labs.

6.0007, HUMAN PERFORMANCE IN AFTI/HAC ENVIRONMENTS
D.N. TOTH, U.S. Air Force, Aerospace Medical Res. Lab., *Wright Patt. A.F.B., Dayton, Ohio* 45433 (DF323700)

To quantify human performance associated with multiple axes acceleration stressors and to develop technologies to exploit the maneuvering potential of vectored force fighter designs in air-to-air and air-to-ground combat. To formulate a mathematical model to describe human performance under these multiaxes accelerations.

Multidisciplinary research programs involving the dynamic environment simulator (DES), human subjects, g seats, varied controls, restraints, cockpit displays and performance variables will be conducted to develop human operator models and evaluate alternative hardware configuration and pilot performance under multiaxes acceleration. One specific purpose of this research is to establish pilot performance capabilities while flying in plus or minus 5 gy and a plus or minus 3 gx direct side force maneuvers.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Labs.

6.0008, CLINICAL STUDY GROUPS/CARDIOVASCULAR CRITERIA FOR AIRCREW SELECTION AND RETENTION
J.H. TRIEBWASSER, U.S. Air Force, School of Aerospace Med., *Brooks A.F.B., San Antonio, Texas* 78235 (DF321590)

Minimize the number of flyers who must be grounded because of the presence of circulatory and respiratory disease. It will be necessary that the significance of the abnormal response to testing procedures in regard to flying performance and safety be better quantified. This effort will accomplish this by establishing the functional and prognostic nature of abnormalities through long-term followup employing newly developed measurement techniques.

Approaches will be developed to allow more precise evaluation of cardiovascular functional integrity and capability in the presence of abnormalities to allow retention of more crewmen in flying duties than previously possible. Techniques will be developed to improve the ability to detect potential problematic disease earlier and permit a more productive preventive approach. Longitudinal studies to assess the significance of disease in aerospace operations coupled with the intensive study of patient groups with specific problems (e.g., acquired bundle branch block) will yield definitive information to help formulate or modify medical standards for aircrew selection and retention. Work was formerly documented under work unit 7755-01-04.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0009, COST-EFFECTIVENESS METHODOLOGY FOR AIRCREW TRAINING DEVICES
B.R. GIRSHAW, Analytic Services Incorporated, *5613 Leesburg Pike, Falls Church, Virginia* 22041 (DF223850; F33615-77-C-0072)

To develop a cost-effectiveness methodology for aircrew training devices that is consistent over a broad range of training situations, flexible in accommodating differences in data inputs and outputs, sufficiently comprehensive to permit inclusion of a variety of significant factors, and simple to use. It will be applicable to the analysis of both existing and future aircrew training system. It will also contribute to the analysis of many aspects of training effectiveness to include determination of device cost-effectiveness, the optimum mix of several devices, and the optimum deployment and utilization strategies for training devices.

A systems approach will be taken to encompass the total aircrew training program including initial and continuation training. The study will be accomplished in phases. Phase I will serve to familiarize the contractor with AFHRLS flying training research program and allow finalization of research approach. Phase II will provide a workable methodology for evaluating the cost-effectiveness of aircrew training systems employing a mix of training devices. Phase III will require a validation of the proposed methodology using data from a current Air Force weapon system aircrew training program. Phase IV will apply the methodology to a proposed Air Force training system. Phase V will document results.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

MATHEMATICAL AND COMPUTER SCIENCES

Includes Mathematical and Computer Sciences (general); Computer Operations and Hardware; Computer Programming and Software; Computer Systems; Cybernetics; Numerical Analysis; Statistics and Probability; Systems Analysis; and Theoretical Mathematics.

7.0001, CONTROL AND COMMUNICATION SYSTEMS APPLICABLE TO THE DESIGN OF AEROSPACE SYSTEMS
A.V. BALAKRISHNAN, Univ. of California, School of Letters & Science, Mathematics, *405 Hilgard Ave., Los Angeles, California* 90024 (DF051350; AF-AFOSR-3550-78)

AF function - design of advanced aircraft control systems. Deficiency - the unification of the separate efforts in structures, aerodynamics, stability and control and propulsion is needed in early design phases. Objective - the objectives of this research are the development of efficient computing algorithms for optimal trajectories based upon the epsilon techniques, the development of theory and techniques for determining stability derivatives of aircraft based on measurements in flight which include wind-gust effects and design of a stability augmentation system thereof and the development of a theory of flutter suppression windgust alleviation for flexible aircraft using distributed parametric models. How work contributes - success in these objectives would contribute to the design of high-performance variable geometry aircraft control systems.

The unification of separate efforts of aircraft design will be pursued using extended techniques to include systems with state space of non-finite dimension (including partial differential equations). The transient and steady state responses and the overall unsteady aerodynamic-aeroelastic problem will be treated as a whole rather than separate entities. A systematic theory of control of uncertain systems -systems that suddenly change parameters - will be developed based on the new formulation of such problems using Markow time theory. The application of 'white noise' theory will be developed for the problem of systems where one-dimensional time is replaced by n-dimensional euclidean space. The theory of state space of non-finite dimension will be investigated for the associated 'system theory' problem.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

7.0002, AN ENCKE METHOD IN POINCARE'-SIMILAR ELEMENTS
H.R. BRYAN, U.S. Air Force, Mathematics Department, *A.F. Acad., Colorado Springs, Colorado* 80840 (DF282130)

AF function - technology base. Deficiency - computer word-length limitations and round-off errors eventually deteriorate the accuracy of numerical algorithms for computing orbital position. Research - apply the classical Encke method to the Poincare'-similar elements. How research contributes - will result in increased accuracy and decreased computational time.

The Encke method has been applied successfully to the DeLaunay-similar elements resulting in three to four additional significant digits of accuracy at certain numerical integration step sizes. A similar procedure will be applied to the Poincare'-similar elements, a set that is topologically regular and therefore applicable to equatorial and circular orbits. The equations will be developed analytically, then computer tests will be conducted.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Frank J. Seiler Research Lab.

7.0003, CATEGORICAL MACHINE THEORY, WITH APPLICATIONS TO SYNTAX-DIRECTED TRANSLATION AND CONTROL THEORY
M.A. ARBIB, Univ. of Massachusetts, School of Arts & Sciences, Computer & Information Science, *Amherst, Massachusetts* 01002 (MCS76-84477)

This research is defined by two types of questions: the first type addresses specific problems within the theories of computation and control; the second explores the applicability of various algebraic techniques. Questions within control theory include a unified theory of machine interconnection, the duality of estimation and control, the proper generalization of the internal model principle, and the extension of the theory of linear continuous-time systems to handle time-varying systems and delay-differential equations. Topics within computation theory include iterative theories, more applicable models of nondeterminism, graph automata, and the algebraic semantics of SIMULA-like languages. Algebraic techniques whose applications will be explored are algebraic theories and topoi (a topos is a general structure which can specialize to boolean or intuitionistic logic on the one hand, and to a category of sheaves as used in algebraic geometry on the other). These tools and those forged in earlier research on categorical machine theory will hopefully make it possible to solve problems in computation and control which would be impossible, or at least highly intractable, without them.

This is a continuation of grant MCS-7203733AO2.

SUPPORTED BY U.S. National Science Foundation, Div. of Mathematical & Computer Sciences

7.0004, FLIGHT-TEST DATA REDUCTION PROGRAM
B.E. SCHUTZ, Univ. of Texas, School of Engineering, Aerospace Engin & Engin Mech, *200 W. 21st, Austin, Texas* 78712

DESCRIPTION: A computer program has been developed which possesses the capability to process data during a flight test in order to compute the trajectory and aerodynamic coefficients of the flight test vehicle. The data types used are onboard rate gyros, accelerometers and a stable platform as well as ground-based data consisting of range, range rate, azimuth, and elevation measurements. The program includes several estimation modes and allows the data span to be partitioned into long arc/short arc estimation of parameters. Several methods for the determination of the evolution of aerodynamic coefficients are being evaluated with particular attention directed toward the accuracy and cost of the determination.

SUPPORTED BY Sandia Labs.

PHYSICS

Includes Physics (general); Acoustics; Atomic and Molecular Physics; Nuclear and High-energy Physics; Optics; Plasma Physics; Solid-state Physics; Thermodynamics and Statistical Physics. For Related Information See Also Engineering.

8.0001, INSTRUMENTATION FOR SCANNING TRANSMISSION ELECTRON MICROSCOPY OF CRYSTALS
J.M. COWLEY, Arizona State University, School of Liberal Arts, Physics, *Tempe, Arizona* 85281 (DMR76-10044)

A high-resolution scanning transmission electron microscope (STEM) will be acquired. It will be adapted and used in a program of experimental and theoretical investigations utilizing the high-resolution capabilities of this instrument.

New operational modes for scanning transmission electron microscopy (STEM) are envisioned which will add important new capabilities of a type not accessible to conventional transmission electron microscopy. In particular the use of two-dimensional detector arrays to record the electron diffraction pattern from each position of the incident scanning electron beam allows the possibilities of significant extensions of the resolution. Also the application of the principles of information theory to such data will permit an important reduction of the radiation damage due to the incident electron beam. The application of these methods to the study of the structures of crystals and their defects will be especially significant. Other applications of the STEM which urgently need exploration include the use for quantitative recordings of intensity data for crystals, the study of surface detail with high resolution and the investigation of inelastic scattering processes.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0002, ISOTOPIC STUDIES ON RARE GASES IN TERRESTRIAL SAMPLES AND IN NATURAL NUCLEOSYNTHESIS
J.H. REYNOLDS, Univ. of California, School of Letters & Science, Physics, *Berkeley, California* 94720 (EY-76-S-03-0034 032)

We do research in rare gas mass spectrometry where the broad objective is to read the natural record which the isotopes of the rare gases comprise as trace constituents of natural gases, rocks, and meteorites. Subterranean fluids and suitable rocks contain several rare gas components: recycled atmospheric gases, radiogenic gases from natural radioactivities in the earth, and--of special interest--gases which from their isotopic signature can be identified either as primordial gases originally trapped in the material from which the earth was formed or products of short-lived radioactivities, now extinct, which decayed soon after the earth was formed. Studies of these components can give us information about the origin of the earth and about flow patterns within the earth, both shallow and deep. These patterns are important both for basic understanding of the earth and for their possible exploitation for geothermal energy. A new program is to design, construct, and operate apparatus which will analyze the elemental and isotopic composition or rare gases from subterranean fluids at or near the sampling site. We have a continuing interest in geochronology, particularly in problems where physicists--as opposed to geologists--can make contributions. Our studies in natural nucleosynthesis use rare gases in meteorites to obtain information about the chronology of nucleosynthesis and of the early solar system. We also study rare gases trapped in the meteorites from the original solar nebula, as clues to the processes which occurred in that nebula and as sensitive monitors of isotopic inhomogeneities in the early solar system.

SUPPORTED BY U.S. Dept. of Energy, Div. of Basic Energy Sciences

8.0003, STATISTICAL PHYSICS
S. MA, Univ. of California, Graduate School, Physics, *P.O. Box 109, San Diego, California* 92037 (DMR77-04679 A01)

This research is a continuation of that supported by DMR 76-08443.

Research in several topics of theoretical statistical mechanics will be carried out. (1) Monte Carlo techniques will be applied to renormalization group calculations. (2) The theory of non-linear interactions and solitons will be studied with the aim of understanding general relaxation mechanisms. (3) The calculation of high-order perturbation terms of statistical mechanical models such as the Ginzburg-Landau model will be carried out.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0004, REACTION KINETICS OVER SURFACES OF SOLIDS
H. SUHL, Univ. of California, Graduate School, Physics, *P.O. Box 109, San Diego, California* 92037 (DMR77-24957)

This research was previously supported by DMR-7624178.

The characterization of simple surface reactions in terms of solid-state parameters will be extended to the cases in which phonons provide the principal energy exchange mechanism. Also, the so-called transmission coefficient of absolute rate theory will be expressed in terms of substrate response functions. A study of adsorption equilibria in relation to substrate properties is to be carried out with a view to separating out substrate effects on the partition function of the activated complex from substrate effects on the pre-exponential factor. A study is to be made of the possibilities for inducing oscillatory reactions over surfaces at will, by coupling to transport phenomena in the substrate. Under previous grants, magneto-catalytic anomalies were explained and a particular one, the initial anomalous oxidation rate of nickel near its Curie point, was both calculated and observed. Under the present grant it is planned to determine if the anomaly can be used as an indicator for studying the details of more advanced stages of the oxidation process. Also, it is planned to attack some long-standing mysteries in catalysis, for example the compensation effect, the extreme sensitivity of certain reactions to rather small applied magnetic fields, anomalous behavior of transport coefficients as a function of adsorbate, etc. Also, coupling between substrate transport properties and adsorbates are to be examined for possible technological uses.

First year of a two-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0005, THEORETICAL STUDIES IN ELEMENTARY-PARTICLE PHYSICS
W. TUNG, Illinois Inst. of Technology, School of Engin. & Phys. Sci., Physics, *3300 S. Federal St., Chicago, Illinois* 60616 (PHY78-11576)

Research will be done in theoretical physics to further our understanding of the elementary particles. There will be an emphasis on utilizing the unique simplifying features of lepton-hadron scattering to probe the structure of nuclear matter and to test the validity of the widely acclaimed candidate for the underlying theory of strong interaction physics - Quantum Chromodynamics (QCD). The standard method for deriving predictions of QCD concerning deep inelastic lepton-hadron scattering will be improved so that a model independent procedure for comparing theory with experiment can be formulated. Since QCD has been motivated mainly by theoretically attractive features and qualitative agreement with experimental trends, such quantitative tests of QCD are urgently needed.

This work is a continuation of that currently supported under NSF grant PHY76-08683 A01. Dr. Tung is the sole principal investigator on that grant.

SUPPORTED BY U.S. National Science Foundation, Div. of Physics

8.0006, HIGH-ENERGY NEUTRINO INTERACTIONS
C.H. ALBRIGHT, Northern Illinois University, School of Liberal Arts & Sci., Physics, *Dekalb, Illinois* 60115 (PHY77-07864)

The investigator will continue his theoretical and phenomenological investigations of various gauge models. Of particular interest are tests of the anomalies found in the charged-current neutrino interactions and the structure of the neutral currents with the purpose of clarifying the types of heavy quarks and heavy leptons and their basic interactions appearing in the underlying unified gauge theory which best describes the experimental situation. This work is a continuation of that currently supported by Foundation grant PHY75-05467 A01.

SUPPORTED BY U.S. National Science Foundation, Div. of Physics

8.0007, MANY-BODY THEORY AND STATISTICAL MECHANICS OF CONDENSED SYSTEMS
C. WOO, Northwestern University, School of Arts & Sciences, Physics, *633 Clark St., Evanston, Illinois* 60201 (DMR76-18375 A01)

This research was previously supported by DMR76-18375 and PHY73-05007. Theoretical research will be carried out in a number of different topics. These will include: (1) Anisotropic mesophases, i.e., liquid crystals, partially ordered plastic crystals, molecular bilayers in membranes, single organic molecular layers adsorbed on water surfaces and elongated molecules adsorbed on solid surfaces. The main purpose is to identify microscopic parameters which are responsible for the macroscopic observables that distinguish these systems qualitatively from the more familiar phases of condensed matter. (2) Nuclear matter, bulk and surface calculations. This will involve the development and solution of equations for infinite nuclear matter. The primary goal is to reproduce the values of the equilibrium density and binding energy per nucleon as obtained from extrapolating available data on finite nuclei. (3) Helium surfaces, interfaces and adsorbed layers. This involves the use of correlated wave functions for calculations on superfluid helium-three and the surfaces of solid and liquid helium. (4) Inhomogeneous electron liquids, metallic surfaces and physisorption as a precursor to chemisorption. These problems will also be attacked through the use of correlated wave functions of the Slater-Jastrow type. This method which has been previously successful in describing the homogeneous electron gas problem, will be applied to metallic hydrogen and superionic conductors, the metallic surface problem and the physisorption-chemisorption problem. (5) Analyses of quantum many-body formalisms. This study will examine the use of correlated wave functions as a means of avoiding the divergences which occur in perturbation theory. Applications to inhomogeneous systems will be investigated.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0008, NUMERICAL PLASMA HYDRODYNAMICS
F.T. ADLER, Univ. of Illinois, School of Engineering, Physics, *2527 Hydrosystems Lab., Urbana, Illinois* 61801

The existing numerical solution of the hydrodynamic equations describing plasmas are based either on direct simulation or on the use of difference methods requiring small time steps. A Green's function approach leading to a Volterra integral equation amenable to solution by a Neuman series has been implemented. The advantage of this approach is the potential use of large time steps, which may make it possible to avoid the stringent computational requirements inherent in existing methods. Preliminary calculations indicate that the approach may be useful in treating warm collisional plasmas as well as potentially applicable to transients covering extended time intervals.

SUPPORTED BY University of Illinois

8.0009, PHYSICS IN THE NEIGHBORHOOD OF CONDENSED OBJECTS
F.K. LAMB, Univ. of Illinois, School of Engineering, Physics, *2527 Hydrosystems Lab., Urbana, Illinois* 61801

Understanding the physical processes that occur near magnetic neutron stars and degenerate dwarfs is important both from the point of view of astronomy, since it is prerequisite for understanding the nature of pulsars and compact x-ray sources, and

from the point of view of magnetospheric physics, since the magnetospheres of these objects provide interesting examples for comparative studies of stellar and planetary magnetospheres. Theoretical calculations of magnetospheric structure and plasma flow patterns are being carried out. When compared with satellite observations of pulsating x-ray stars, x-ray burst sources, and cataclysmic variable stars, these calculations will provide new information about the properties of these stars, and about the properties of matter at high temperatures in super strong magnetic fields.

SUPPORTED BY Alfred P. Sloan Foundation

8.0010, DEFECT PROPERTIES OF SOLIDS
D. LAZARUS, Univ. of Illinois, School of Engineering, Physics, *2527 Hydrosystems Lab., Urbana, Illinois* 61801 (EY-76-C-02-1198)

Our research program is directed toward understanding the basic atomistic mechanisms responsible for mass flow (diffusion) in solids and effects of high pressure on defect and electronic properties of solids. Measurements of diffusion with radioactive tracers have disclosed anomalies in body-centered cubic transition metal systems. Measurements are also underway involving mass and charge transport in superionic solids, as functions of both temperature and pressure. We are also studying the effects of high pressure on the electronic properties of micromagnetic and spin-glass alloys. First results indicate a large volumetric effect and an anomalous temperature dependence in the electrical resistivity.

SUPPORTED BY U.S. Dept. of Energy, Unspecified Unit

8.0011, TRANSPORT AND THERMODYNAMIC PROPERTIES OF SOLIDS
R.E. GRACE, Purdue University, School of Materials Engin., *Life Sciences Bldg., Lafayette, Indiana* 47907 (E(11-1)-1436)

The objective of the program is to investigate atomic diffusion, interfacial stability and development of diffusion structures in solid multicomponent, multi-phase alloys and intermetallic systems. Intrinsic and interdiffusion coefficients are evaluated with diffusion couples in the following ternary systems: Fe-Ni-Al and Cu-Zn-Ni. The diffusion couples are analyzed by electron microprobe analysis and scanning electron microscopy. The development of nonplanar interfaces between diffusion layers is explored in terms of nonequilibrium compositions and the related profiles of thermodynamic activities of the diffusion components observed in the vicinity of perturber interfaces.

SUPPORTED BY U.S. Dept. of Energy, Div. of Physical Research

8.0012, FAR INFRARED PROPERTIES OF SEMIMETALS AND DEGENERATE SEMICONDUCTORS
H.D. DREW, Univ. of Maryland, School of Arts & Sciences, Physics, *College Park, Maryland* 20742 (DMR77-28399)

Far infrared optical and magnetooptical studies of semimetals and semiconductors previously supported by NSF grant DMR-7302398 A03 will be continued. Primary emphasis will be on the determination of final state interaction effects in cyclotron resonance transitions in degenerate semiconductors.

The study of the magnetooptical properties of graphite in the far infrared will be completed. The planned measurements at several additional frequencies should provide useful band structure information and possibly evidence for electron-electron interaction effects. A program will be initiated to investigated the optical properties of BiSb alloys. The electron-electron interaction effects will be studied as a function of the carrier density. Also an optically pumped far infrared laser will be constructed for use in these experiments. This laser will also be used for the study of energy gaps in such systems as the excitonic insulator energy state in BiSb alloys and the charge density wave state in Si inversion layers and layered compounds.

This is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0013, OPTIMUM ION ENERGY FOR MICROSCOPY
F.W. MARTIN, Univ. of Maryland, School of Arts & Sciences, Physics & Astronomy, *College Park, Maryland* 20742 (AT(11-1)-2454)

An absolute experimental investigation was made of the yield of X rays produced by ion-atom collisions of a type expected to be of use in microscopy of biological molecules. Absolute cross sections are largest for ions with very high velocities, corresponding to approximately 1 MeV/amu, and have values as large as 2 x 10/sup -19/square centimeters for solid targets and 2 x 10/sup -18/square centimeters for methane. Ion-induced X-ray spectra of carbon atoms were measured for the first time, and were found to be very weak, in contrast to the strong excitation the satellites of harder x-rays by ions. Signal-to-background, signal-to-electronic-damage, and signal-to-displacement-damage ratios were evaluated from the data and compared to the corresponding ratios in electron microscopy.

BIBLIOGRAPHIC REFERENCE: F.W. Martin, W. Freeman and J. Sauls, Soft X-Ray Spectra of Boron and Carbon Excited by 10 to 40 MeV C, N, O Ions, J. Phys. B10, L439 (1977); F.W. Martin and R.K. Cacak, A Double-Focusing Soft X-Ray Spectrometer, J. Phys. E9, 662 (1976).

SUPPORTED BY U.S. Dept. of Energy, Div. of Biomedical & Environmental Research

8.0014, PARTICLE THEORY
H. GOLDBERG, Northeastern University, School of Liberal Arts, Physics, *360 Huntington Ave., Boston, Massachusetts* 02115 (PHY76-11456 A01)

Theoretical research will include: 1. Data analysis of the reaction piN yields pi piN in the C.M. energy region 1,300-2,200 MeV using a unitary and analytic isobar model; 2. study of the 3 pi system in the region of the A1 resonance using relativistic three-body equations; 3. studies of CP-violation and very heavy quarks; 4. study of photon-photon scattering in colliding beams. 5. A regge approach to confinement in YM color theories.

This work represents a continuation of that currently supported by Foundation grant PHY71-03134 A04.

SUPPORTED BY U.S. National Science Foundation, Div. of Physics

8.0015, SPECTROSCOPIC STUDIES OF PHASE TRANSITIONS AND COLLECTIVE EXCITATIONS IN SOLIDS
C.H. PERRY, Northeastern University, School of Liberal Arts, Physics, *360 Huntington Ave., Boston, Massachusetts* 02115 (DMR75-06789 A02)

The objective of the present program is to continue research supported by NSF grant DMR-7506785 on the experimental and theoretical investigations of the optical properties of materials. This program includes studies of order-disorder transitions in mixed crystals, optical phonons and structural phase transitions in displacive ferroelectrics, optical measurements in solids under variable uniaxial stress and temperature, infrared absorption and Raman scattering in metals, intermetallic materials and layered compounds and magnetic systems.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0016, COINCIDENCE AUGMENTED DIFFERENTIAL ION ENERGY-LOSS SPECTROMETRY
J.T. PARK, Univ. of Missouri, School of Science, Physics, *Rolla, Missouri* 65401 (PHY78-07907)

This project in atomic physics studies the fundamental properties of the collisions of atoms at energies (up to 200 keV) well in excess of the atomic binding energies. A unique ion energy-loss spectrometer is used to measure the details of the collision process with a resolution of one part per million and better in energy, and simultaneously measure the scattering angles. It will be possible to measure the excitation of specific excited states in atomic hydrogen by incident protons, as well as the details of differential charge transfer scattering. In parallel, the collision products (including the photons emitted by excited atoms) will be detected. These studies will be extended to more complex atoms.

This is a continuation of work supported by NSF Grant PHY74-09671 A04.

SUPPORTED BY U.S. National Science Foundation, Div. of Physics

8.0017, TRICRITICAL PHENOMENA AND DYNAMICS OF HYDROGEN-BONDED CRYSTALS
V.H. SCHMIDT, Montana State University, School of Letters & Sciences, Physics, *Bozeman, Montana* 59715 (DMR78-09205)

The 'critical' point in a liquid-gas system is the temperature and pressure at which it is impossible to distinguish between the liquid and gas, i.e., the surface tension goes to zero. Other types of systems, such as magnetic systems, superfluids, and those with turbulent flow also show critical phenomena. A recent major development in a unified theoretical treatment of all these phenomena. The importance of Professor Schmidt's work is that the ferroelectric, hydrogen bonded salts (such as KH2PO4) are different from other types of systems studied, have four variables that can be changed at will, and thus offer a specially favorable opportunity to examine dynamic effects near tricritical points and to test theory of critical phenomena.

Static and dynamic phenomena associated with phase transitions are investigated in potassium hydrogen (or deuterium) phosphate-type ferroelectric crystals by means of dielectric, nuclear magnetic resonance, birefringence, Brillouin scattering, and/or neutron scattering measurements. These measurements are made at various temperatures and pressures, with various applied electric fields, and with varying degrees of deuteration to examine behavior near the critical lines in temperature-pressure-electric field space and near the tricritical point which occurs at about 2.4 kbar in KH2PO4.

This is a continuation of work supported under DMR 76-11828. It is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0018, ATOMIC AND MOLECULAR PHYSICS IN SUPPORT OF CTR
T.A. GREEN, Sandia Laboratories, *P.O. Box 5800, Albuquerque, New Mexico* 87115 (00002056)

Calculation of electron excitation cross sections for highly stripped impurity ions in CTR plasmas for use in line-radiation power loss calculations.

SUPPORTED BY U.S. Dept. of Energy

8.0019, THEORETICAL NUCLEAR PHYSICS
C.M. SHAKIN, City University of New York, Graduate School, Physics, *Bedford Ave. & Ave. H, Brooklyn, New York* 11210 (PHY77-05016 A01)

Research in theoretical nuclear physics initiated under NSF grant PHY75-06932 A01 will be continued. Topics to be investigated include: 1. pion physics; a. pion-nucleus scattering; b. pion creation and absorption; 2. deuteron-nucleus collisions; 3. many-body theory; 4. heavy-ion physics; a. foundations of TDHF theory for heavy-ion collisions; b. heavy-ion collisions at medium and high energies; 5. three-body problem at medium and high energies; 6. general scattering theory; 7. scattering of electrons by nuclei.

SUPPORTED BY U.S. National Science Foundation, Div. of Physics

8.0020, ELECTRODYNAMICAL AND FLUID DYNAMICAL PHENOMENA IN ASTROPHYSICS
E.A. SPIEGEL, Columbia University, School of Arts & Sciences, Physics, *Broadway & W. 116th St., New York, New York* 10027 (PHY77-27086)

Research in theoretical astrophysics initiated under NSF grant PHY75-05660 A02 will be continued. Topics to be investigated include: Pulsar Electrodynamics; 1. The polarization of radio emission from pulsars; 2. High-energy pulsar radiation and double pulses; 3. Electron-positron creation in pulsar magnetospheres.

Fluid Dynamics; 1. The Maunder minimum; 2. Interaction of pulsation with convection; 3. Convection in the solar core.

Miscellaneous; 1. Explosive matter at neutron star surfaces; 2. Consequences of rapid solidification of dense stellar matter; 3. Line broadening in an expanding medium; 4. Collisionless shocks in supernova remnants.

SUPPORTED BY U.S. National Science Foundation, Div. of Physics

8.0021, EXPERIMENTAL STUDIES OF GRAVITATION - GRAVITATIONAL RADIATION
D.H. DOUGLASS, Univ. of Rochester, School of Arts & Sciences, Physics & Astronomy, *260 Crittenden Blvd., Rochester, New York* 14627 (PHY77-07315 A01)

Research will continue on the design and operation of gravitational wave detectors of greatly increased sensitivity. A conventional room-temperature detector has been improved, and will continue in operation to search for signals at a level of 1 GPU. The feasibility study on dielectric detectors will be completed, and a small silicon crystal will be used as an antenna. Future work will include construction and use of a large (100 kg) crystal cryogenic detector which is expected to have a sensitivity in the range of 10 to the minus 3rd power to 10 to the minus 7th power GPU.

This work is a continuation of that currently supported under NSF grant number PHY72-04755 A05.

SUPPORTED BY U.S. National Science Foundation, Div. of Physics

8.0022, LEED CRYSTALLOGRAPHY AND SURFACE RECONSTRUCTION
F. JONA, State University of New York, School of Arts & Sciences, Physics, *Stony Brook, New York* 11790 (DMR77-27933)

Experimental studies of atomic structures on single crystal surfaces using low-energy electron diffraction (LEED) which previously were funded by NSF grant DMR-7203294 will be continued. This research will be concentrated in three areas: (1) The problem of structural reconstruction on semiconductor surfaces. This effort will include work on the structure of Ge(001)2x1 and Si(001)2x1, as well as studies of metallic adsorbates on both the (001) and the (111) surfaces of of Si and Ge. (2) The problem of molecular adsorption and structural reconstruction on metal surfaces. This effort will involve reexamination of the low-temperature reconstruction on W(001) and Mo(001), and resumption of analyses of the ordered chemisorbed layers of CO and O on Mo(001). (3) The investigation of search procedures for the rapid identification of probable and improbable models in LEED crystallography.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0023, PROPERTIES OF ANISOTROPIC RELAXATION SEMICONDUCTORS
J.F. SCHETZINA, Univ. of North Carolina, School of Math. & Phys. Scis., Physics, *Raleigh, North Carolina* 27607 (DMR77-08443 A01)

This program will be a detailed experimental investigation of the photovoltaic properties of cadmium telluride films. Experimental observations of the photomagnetoelectric and 'anomalous' photovoltaic effects in these films will be compared with predictions of a new model which, through theory for the conductivity-locked, variably anisotropic relaxation semiconductor, introduces the new concept of the isojunction. The experiments will be performed using well-characterized samples prepared under controlled growth conditions. Optical absorption, x-ray diffraction, and x-ray fluorescence spectra will be obtained for each film and will be correlated with growth parameters. Selective photomagnetoelectric effect measurements will be used to obtain experimental values for the conductivity ratio, the Hall angle, the carrier diffusion length, and the surface recombination velocities for each film. Measurements of the 'anomalous' photovoltaic properties will be used to obtain information on the

magnitude of the conductivity anisotropy and its variation with film depth and will be related to film growth and structural parameters.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0024, STUDIES IN GENERAL RELATIVITY THEORY
F.P. ESPOSITO, Univ. of Cincinnati, School of Arts & Sciences, Physics, *Van Wormer Adm. Bldg. Rm. 204, Cincinnati, Ohio* 45221 (INT75-18457 A02)

This award is being given jointly by NSF and the Venezuelan Government to enable Drs. F. Paul Esposito and Louis Witten of the University of Cincinnati to carry on a cooperative research program in 'Studies in General Relativity Theory' with their Venezuelan colleague, Dr. Louis Herrera, of the Universidad Central de Venezuela.

Their studies of the properties of exact solutions of Einstein's General Relativity Equations and of the behavior of perfectly conducting fluids in strong magnetic and gravitational fields are important for the further development of black hole theory and have astrophysical applications in the understanding of stellar collapse.

This award is a renewal of a previous one given to these researchers on the same subject.

SUPPORTED BY U.S. National Science Foundation, Div. of International Programs

8.0025, PHASE TRANSITION IN SOLID HYDROGEN ALLOYS AND OTHER DISORDERED SYSTEMS
J.R. GAINES, Ohio State University, School of Math. & Phys. Scis., Physics, *164 W. 17th Ave., 102 Administration Bldg., Columbus, Ohio* 43210 (DMR78-07527)

Experimental studies will be made of phase transitions in soild hydrogen below O.5K. Nuclear magnetic resonance techniques will be used to study single crystals containing very low concentrations of orthohydrogen. Measurements of the heat capacity of small samples of solid hydrogen will be made above and below the transition temperature. This work is important to understanding the behavior of quantum solids.

This is a continuation of work supported under DMR76-11427. First year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0026, PHYSICS AND TECHNOLOGY OF MATERIALS
N. SPIELBERG, Kent State University, School of Arts & Sciences, Physics, *Hilltop Dr., Kent, Ohio* 44242 (SER78-00596)

Three new courses will be developed as an integrated introduction to materials science for Technology and other students, as well as for specialists. Prerequisites for these courses are one year of introductory physics and two quarters of calculus. The first course covers the application of selected concepts from modern condensed state physics to the electrical, magnetic and optical properties of solids. The second and third courses will deal with material science and physical metallurgy. The courses will be designed to maximize student comprehension of the ways in which basic physical concepts contribute to understanding and utilization of the technical properties of materials. The project calls for (1) intensive joint development by Physics and Technology faculty, review of applicable pedagogical material, and design of evaluation procedures during the first summer of the program; (2) teaching of the courses with ongoing evaluation and minor revision during the following academic year; (3) major revision as required during the second summer; and (4) a second round of teaching to establish the courses permanently in the curriculum. With the present student body makeup, 40 or 50 students per year will be served. The courses should also be suitable for evening and extension students. The detailed lecture notes and other material developed should be of value for ongoing use in these and other courses.

SUPPORTED BY U.S. National Science Foundation, Div. of Science Education Resources Improvement

8.0027, MAGNON-PHONON INTERACTIONS
G.S. DIXON, Okla. St. Univ., School of Arts & Sciences, Physics, *Agriculture Hall, Stillwater, Oklahoma* 74075

Theoretical and experimental studies of magnon-phonon interactions.

SUPPORTED BY Oklahoma State Government

8.0028, MILLIKELVIN STUDIES OF SOLID HELIUM-3 MAGNETIC EFFECTS AND SUPERCONDUCTING AMORPHOUS TRANSITION METALS
W.P. KIRK, Texas A & M University System, School of Science, Physics, *College Station, Texas* 77843 (DMR78-10808)

An experimental study will be made at low temperature of the unusual magnetic and nuclear spin ordering effects in solid helium-3. Nuclear magnetic resonance techniques will be used to obtain more accurate measurements of the magnetic susceptibility at various molar volumes. The magnetic properties of solid helium-3 will be studied at interfaces of magnetic materials. The use of submillikelvin cooling techniques and nuclear magnetic resonance techniques will be extended to the study of amorphous transition metals. These studies are important to the clarification of the behavior of quantum solids and to understanding the properties of metallic glasses.

This is a continuation of work funded under DMR76-09807.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

SPACE SCIENCES

Includes Space Sciences (general); Astronomy; Astrophysics; Lunar and Planetary Exploration; Solar Physics; and Space Radiation. For Related Information See Also Geosciences.

10.0001, ASTRONOMICAL OBSERVATIONS AT MILLIMETER AND SUB-MILLIMETER WAVELENGTHS
M. WERNER, Calif. Inst. of Technology, Graduate School, Physics, *1201 E. California Blvd., Pasadena, California* 91109 (AST76-81092)

A 10.4 meter prototype telescope for millimeter wavelengths has been designed and built by Dr. R.B. Leighton of California Institute of Technology (CIT). This telescope is now at Owens Valley Radio Observatory (OVRO). A second telescope (1.6 meter) previously used for a 2-micron sky survey has been moved from Mt. Wilson to White Mountain to be used jointly with the Astronomy Laboratory of the University of California, Berkeley. The altitude at the White Mountain site is 13,000 feet and an additional purpose of the move of the 1.6 meter telescope is to test White Mountain as a potential site for a 10.4 meter telescope.

A two-part program using the 1.6 meter and 10.4 meter telescopes for observations at wavelengths of 1 millimeter and shorter will be carried out. Firstly, initial observations on the 10.4 meter telescopes will be carried out at Owens Valley using the composite bolometer detecting system which has been used successfully for several years for 1 millimeter observations on the 200 inch telescope. Secondly, the observations with the 1.6 meter telescopes on White Mountain will be continued. The experience gained from the observations will be quickly fed back into a substantial program of instrumental development intended to produce improved photometers and detectors optimized for use with the existing telescopes and with a future 10.4 meter telescope to be located at a good dry site, possibly White Mountain.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0002, BRIGHT STAR CATALOGUE AND PARALLAX CATALOGUE
W. VANALTENA, Yale University, Graduate School, Astronomy, *206 Elm, New Haven, Connecticut* 06520 (AST75-17847 A01)

The Yale Bright Star Catalogue and the Yale General Catalogue of Trigonometric Parallaxes will be updated with both improved and new data available since the previous editions were published in 1964 and 1963, respectively. A third of the bright stars have had changes or additions to their data. More than 1,200

new parallaxes are available. A thorough statistical analysis of the parallaxes will be undertaken to determine the best weighting system and reduction of the results from various observatories to a uniform system. The Stellar Data Center at Strasbourg will collaborate on the work.

Approximately two years will be required to complete and publish both catalogues.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0003, STELLAR PARALLAXES AND PROPER MOTION
W.F. VANALTENA, Yale University, Graduate School, Astronomy, *206 Elm, New Haven, Connecticut* 06520 (AST76-81339 A01)

A program of astrometric research, with increasing emphasis on southern hemisphere coverage, will be continued. The determination of stellar parallaxes and proper motions by astrometric methods furnishes basic data important to other areas of astronomy. A star's distance from parallax measures permits finding the true brightness of the star and its position in space. The motions, from a comparison of stellar positions made with an interval of several years between observations, help to determine the sun's path among the stars and its position within our galaxy. The yardstick for all cosmic distances ultimately depends on these astrometric researches.

Over the next two years the Yale investigators will work to reduce the deficiency of astrometric observations in the southern skies. Completion of the Yale Southern Proper Motion Program first epoch observations in Argentina, and an extension of the overlap with the Lick Observatory Northern Program, will be given top priority. Stellar parallax determinations, in part from early Yale observations in South Africa, will be continued. Membership determinations in southern star clusters from proper motion studies will be undertaken with the Yale astrometric telescope at Cerro Tololo Inter-American Observatory in Chile. A continuing effort will be made towards improving astrometric instrumentation and deriving all relevant positional information from photographic images to better utilize existing and future plate material.

Prior support was by NSF grant AST 76-81339.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0004, STUDIES OF COOL STARS USING SYNTHETIC SPECTROSCOPY
R.A. BELL, Univ. of Maryland, School of Engineering, Physics & Astronomy, *College Park, Maryland* 20740 (AST77-21094)

The research described in this proposal will improve our knowledge of the physical properties of stars in our own and in nearby galaxies. The tools to be used for this purpose are a set of computer programs and a large file of data for atomic and molecular spectral lines. One computer program will be used to compute mathematical models of stellar atmospheres. These models are flux-constant and include convection and a detailed treatment of the effects of line absorption on the atmospheric structure. The models and atomic and molecular data will be used to compute theoretical stellar spectra and theoretical colors. The spectra and the colors will be compared with observed stellar spectra and colors. The best fits will yield the temperatures, gravities and chemical compositions of the stars.

The primary topics to be investigated in the present proposal are the properties of cool giant stars, with particular emphasis on globular cluster stars and their peculiarities, and the calculation of model atmospheres for other types of stars such as F and G dwarfs, cepheid variables, RR Lyraes and M giants. Other work will be concerned with the interpretation of spectroscopic K line measurements of RR Lyraes, the abundance and gravity sensitivity of TiO bands and the calculation of limb darkening coefficients.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0005, MULTI-FREQUENCY OBSERVATIONS OF EXTRAGALACTIC RADIO SOURCES
A.G. WILLIS, Brandeis University, School of Arts & Sciences, Astrophysics, *415 South St., Waltham, Massachusetts* 02154 (AST77-22906)

The research on the properties of non-thermal extragalactic radio sources will be mainly concerned with three topics: 1) The distribution of total intensity and linear polarization in extended radio galaxies, 2) Observations of active nuclear sources in Seyfert galaxies, and 3) Statistical analyses of the properties of faint radio sources detected in deep Westerbrook source surveys.

Detailed observations of well resolved extended radio galaxies as well as of the nuclei of Seyfert galaxies should give us further insight into the energetic processes occurring in these powerful radio sources. It is particularly important for us to learn how individual radio sources produce the enormous amounts of energy that they radiate since observations of such sources should, in principle, be able to tell us about the geometry of the universe itself. However, we must better understand the evolutionary processes occurring in radio sources in order to separate out evolutionary effects from geometric ones.

It is of great interest to study samples of faint radio sources where geometric and evolutionary effects are significant. The results deduced from the observations will permit astronomers to place constraints on the nature of the radio source evolution, which probably changes as a function of the redshift or 'look back' time to the early universe.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0006, SPECTROSCOPY OF FAINT SOURCES
A. SLETTEBAK, Ohio State University, School of Math. & Phys. Scis., Astronomy, *164 W. 17th Ave., 102 Administration Bldg., Columbus, Ohio* 43210 (AST77-26890)

Observations with an image-dissector scanner attached to a Cassegrain spectrograph on the Perkins 72-inch telescope in Flagstaff, Arizona, will be made of objects identified by means of three independent deep-sky surveys: (1) the Steward Observatory Near-Infrared Photographic Sky Survey, (2) Dr. A. A. Hoag's lists of faint objects with peculiar emission, obtained through the use of transmission-grating slitless spectroscopy, and (3) the Ohio State University Radio Observatory lists of radio sources. Many different kinds of objects, both galactic and extragalactic, have been and are being detected by these surveys and will be studied spectroscopically with the image-dissector scanner. These observations are expected to help provide a better understanding of the galactic structure and the morphology of external systems.

This grant will provide funds for the acquisition of a minicomputer at the Ohio State University for data reduction and software development, and for travel to make the necessary observations.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0007, LONG-RANGE ANTINEUTRINO BURST DETECTOR
K.E. LANDE, Univ. of Pennsylvania, School of Arts & Sciences, Astronomy, *34th & Spruce Sts., Philadelphia, Pennsylvania* 19104 (AST76-17786 A01)

This research grant provides support for completion of construction and initial operation of a five hundred cubic meter neutrino and antineutrino burst detector situated in the Homestake Gold Mine in Lead, South Dakota. The detector will consist of ninety-six water Cerenkov counter modules and eighty liquid scintillation counters and will look for: 1) neutrinos and antineutrinos from collapsing stars in our galaxy; 2) high-energy neutrinos from localized extraterrestrial sources such as young pulsars; 3) oscillations of neutrinos produced by cosmic ray primaries in the Earth's atmosphere.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0008, THEORETICAL STUDY OF PLASMA INTERACTIONS NEAR ROTATING CONDENSED MAGNETIZED OBJECTS

F.C. MICHEL, Rice University, Graduate School, Space Physics & Astronomy, *6100 Main St., Houston, Texas* 77001 (AST77-22675)

This research will be concerned with predicting the physical conditions around compact stars that are rapidly spinning and also possess strong magnetic fields. Such objects have been proposed to explain both the pulsar phenomenon and certain types of X-ray sources. There will be work on current models of these objects in order to resolve problems existing in these models and determine what modifications are needed. There will be research on the stability of the magnetic fields surrounding pulsars and X-ray sources when matter is falling onto such objects. There will be theoretical investigations of the mechanisms which might account for the coherent radio frequency emission observed from pulsars.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

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Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N79-11995*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
CORRELATION OF PREDICTED AND MEASURED THERMAL STRESSES ON A TRUSS-TYPE AIRCRAFT STRUCTURE
Jerald M. Jenkins, Lawrence S. Schuster, and Alan L. Carter Nov. 1978 57 p refs
(NASA-TM-72857; H-1074) Avail: NTIS HC A04/MF A01 CSCL 20K

A test structure representing a portion of a hypersonic vehicle was instrumented with strain gages and thermocouples. This test structure was then subjected to laboratory heating representative of supersonic and hypersonic flight conditions. A finite element computer model of this structure was developed using several types of elements with the NASA structural analysis (NASTRAN) computer program. Temperature inputs from the test were used to generate predicted model thermal stresses and these were correlated with the test measurements. Author

N79-11996# European Space Agency, Paris (France).
LA RECHERCHE AEROSPATIALE. BI-MONTHLY BULLETIN NO. 1978-1
Aug. 1978 125 p refs Transl. into ENGLISH of La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1978-1, Jan.-Feb. 1978 p 1-52 Original French report available from ONERA, Paris FF 36
(ESA-TT-491) Avail: NTIS HC A06/MF A01

The following topics are discussed: a new method for correcting two-dimensional wall interference, contribution of high-voltage electron microscopy to the study and improvement of refractory composites, dynamic stability of a two-blade rotor, an experimental study of the dynamic forces acting on an airfoil, and creep prediction of directionally solidified Cotac 74 composite. For individual titles, see N79-11997 through N79-12001.

N79-11997 European Space Agency, Paris (France).
A NEW METHOD FOR CORRECTING TWO-DIMENSIONAL WALL INTERFERENCE **c02**
Claude Capelier (ONERA), Jean-Pierre Chevallier (ONERA), and Fernand Bouniol (ONERA) *In its* La Rech. Aerospatiale, Bi-monthly Bull. No. 1978-1 (ESA-TT-491) Aug. 1978 p 1-30 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1978-1, Jan.-Feb. 1978 p 1-11 Presented at the 14th Applied Aerodyn. Colloq., Toulouse, 7-9 Nov. 1977 Original report in FRENCH previously announced as A78-32035 (For primary document see N79-11996 03-01)
HC A06/MF A01

The new method proposed for correcting wind tunnel wall effects departs from classical methods by doing away with the traditional boundary conditions, questionable for ventilated walls and not adapted to deformed walls. It replaces them by the direct introduction of wall velocity measurements, thus eliminating the uncertainties on the reference readings; it thus avoids the necessity of redundant tests to determine the porosity characteristics. It presents the advantage of not requiring the resolution of large linear systems, but only the numerical integration of simple functions of the discrepancies between the velocities measured at the walls and those due to the model, classically calculated by representative singularities in unlimited flow. Two examples of application are presented: the theoretical case of the flow around a vortex in a perforated wall test section (NACA 0012 profile in a guided section, numerically treated for an ideal fluid); and concrete cases of wind tunnels with adapted walls and perforated walls. Author (ESA)

N79-11998 European Space Agency, Paris (France).
CONTRIBUTION OF HIGH-VOLTAGE ELECTRON MICROSCOPY TO THE STUDY AND IMPROVEMENT OF REFRACTORY COMPOSITES **c24**
Jean-Francois Stohr (ONERA) *In its* La Rech. Aerospatiale, Bi-monthly Bull. No. 1978-1 (ESA-TT-491) Aug. 1978 p 31-62 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1978-1, Jan.-Feb. 1978 p 13-24 Original report in FRENCH previously announced as A78-32036 (For primary document see N79-11996 03-01)
HC A06/MF A01

High voltage electron microscopy was found to be an especially effective method of analyzing structural deformations of directionally solidified composites such as Cotac. Results of mechanical and thermal stresses on Cotac material are described with reference to the fiber-matrix interface. Tensile tests revealed dislocation pile-ups against the fibers. Plastic deformation was effected through in situ cycling tests. Diffusion mechanisms along the fibers were examined at high temperatures. Some suggestions for improving thermal stability are presented. Author (ESA)

N79-11999 European Space Agency, Paris (France).
DYNAMIC STABILITY OF A TWO-BLADE ROTOR **c05**
Cam Thuy Tran (ONERA) *In its* La Rech. Aerospatiale, Bi-monthly Bull. No. 1978-1 (ESA-TT-491) Aug. 1978 p 63-96 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1978-1, Jan.-Feb. 1978 p 25-40 Original report in FRENCH previously announced as A78-32037 Supported in part by the Aeronautical Test Centre, Toulouse (For primary document see N79-11996 03-01)
HC A06/MF A01

An analytical method is presented in which Lagrange equations are simplified to a system of ordinary differential equations with constant coefficients in an evaluation of the dynamic stability of a two blade rotor at high tip speeds with negligible aerodynamic disturbance. Attention is given to the parameterization of the divergence velocity. It is noted that the coupling of the degrees of freedom of the rotating arm and of the flexibility degrees of freedom of the stand may provoke divergence. Author (ESA)

N79-12000 European Space Agency, Paris (France).
AN EXPERIMENTAL STUDY OF THE DYNAMIC FORCES ACTING ON AN AEROFOIL **c02**
Edmond Szechenyi (ONERA) *In its* La Rech. Aerospatiale,

Bi-monthly Bull. No. 1978-1 (ESA-TT-491) Aug. 1978 p 97-112 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1978-1, Jan.-Feb. 1978 p 41-47 Presented at the 3d European Forum on Rotating Airfoils and Dyn. Lift, Aix-en-Provence, France, 7-9 Sep. 1977 Original report in FRENCH previously announced as A77-50995 (For primary document see N79-11996 03-01)
HC A06/MF A01

Aerodynamic instabilities and random excitations occurring on two-dimensional airfoils at nonzero incidence angles and subsonic flow speeds were studied experimentally with particular attention devoted to stall flutter. For the purpose of investigating separately the buffeting phenomenon and the risk of aeroelastic instability at high incidence, the random pressure field was measured on clamped airfoils, while unsteady aerodynamic coefficients which reveal the possibility of instabilities for certain torsion modes were obtained from vibrating airfoils. Shadowgraph flow visualizations were filmed at high speeds and show the flow conditions for random excitation (buffeting) and for two types of aerodynamic instability, one of which is stall flutter, the other being a shock instability on the lower surface of the airfoil. Author (ESA)

N79-12001 European Space Agency, Paris (France).
CREEP PREDICTION OF DIRECTIONALLY SOLIDIFIED COTAC 74 COMPOSITE **c24**
Tasadduq Khan (ONERA) *In its* La Rech. Aerospatiale, Bi-monthly Bull. No. 1978-1 (ESA-TT-491) Aug. 1978 p 113-121 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1978-1, Jan.-Feb. 1978 p 49-52 Original report in FRENCH previously announced as A78-32038 (For primary document see N79-11996 03-01)
HC A06/MF A01

A two part study conducted to evaluate Cotac composites in long term turbine applications (up to 10,000 hrs) is presented. In the first part, the universal creep equation of Evans and Harrison is used to assess friction stress. In the second part, a set of parallel straight lines with a slope of 0.066 is used to express the relationship between the logarithm of stress and that of time to rupture at various temperatures. Author (ESA)

N79-12002# Michigan State Univ., East Lansing.
CORROSION TRACKING AND PREDICTION FOR C-141A AIRCRAFT MAINTENANCE SCHEDULING Final Report, Sep. 1975 - Oct. 1977
Robert Summitt Wright-Patterson AFB, Ohio AFML Apr. 1978 242 p refs
(Contract F33615-75-C-5284)
(AD-A057984; AFML-TR-78-29) Avail: NTIS HC A11/MF A01 CSCL 01/3

Analysis of corrosion maintenance and utilization histories of C-141A aircraft has shown that these records can be used to develop a corrosion-prediction model. Exploitation of such a model could result in better efficiency in the use of aircraft, maintenance facilities, and manpower, since corrosion maintenance could be scheduled at the optimum time with respect to repairability, need, and available resources. The USAF Maintenance Data Collection System does not generate sufficiently accurate and consistent records, however, to base a prediction model on existing data. A number of changes to the System would improve the quality of the data sufficiently so that an effective model could be developed. Potential cost benefits are far larger than those needed to effect the changes, hence the recommended changes should be implemented at an early date. Author (GRA)

N79-12003# Naval Air Engineering Center, Lakehurst, N.J. Ground Support Equipment Dept.
NON-DESTRUCTIVE EVALUATION SYSTEMS FOR THE NAVAL AVIATION MAINTENANCE ENVIRONMENT TECHNOLOGY ASSESSMENT Final Report, Aug. 1972 - Sep. 1977
R. Cahall 5 Jul. 1978 129 p refs
(AD-A058146; NAEC-GSED-120) Avail: NTIS HC A07/MF A01 CSCL 01/5

Under NAVAIRSYSCOM direction, NAEC-GSED conducted an investigation and analysis of the field of non-destructive evaluation as it relates to the Naval aviation community. This report finalizes that task. Areas of discussion include: general description of what NDE is and why it is practiced, how inspection requirements are established and suggested methods for improvement, assessment of the positive impact expanded utilization of NDE could provide, discussion of present and future field inspection requirements, technology base assessment/projection, and recommended research program options.
Author (GRA)

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N79-12004 Engineering Sciences Data Unit, London (England).
PROFILE DRAG OF AXISYMMETRIC BODIES AT ZERO INCIDENCE FOR SUBCRITICAL MACH NUMBERS
Jul. 1978 19 p
(ESDU-78019; ISBN-0-85679-221-7) For information on availability of series, sub-series, and other individual data items, write NTIS, Attn: ESDU, Springfield, Va. 22161. HC $434.50

A simple method is presented for estimating the profile drag of any closed axisymmetric body (with or without a cylindrical midbody) at zero incidence and at Mach numbers for which the flow over the body is wholly subsonic. ESDU

N79-12005 Engineering Sciences Data Unit, London (England).
TRUE AIRSPEED IN THE INTERNATIONAL STANDARD ATMOSPHERE AND EQUIVALENT AIRSPEED CORRESPONDING TO MACH NUMBER AND PRESSURE ALTITUDE
Jul. 1978 9 p
(ESDU-78017; ISBN-0-85679-219-5) For information on availability of series, sub-series, and other individual data items, write NTIS, Attn: ESDU, Springfield, Va. 22161. HC $242.50

Data for use in aircraft strength and performance calculations for altitudes up to 32,000 meters (105,000 feet) and Mach numbers up to 3.0 are presented as an aid in designing aircraft structures and in estimating aircraft performance. Author

N79-12006 Ohio State Univ., Columbus.
AN EXPERIMENTAL STUDY OF TURBINE AIRFOIL PRESSURE SURFACE BOUNDARY LAYER TRANSITION REGION AND WAKE CHARACTERISTICS Ph.D. Thesis
Wesley Roland Cox 1978 243 p
Avail: Univ. Microfilms Order No. 7819573

Smoke flow visualization and hot-wire anemometer studies were conducted to determine some of the wake and pressure surface boundary layer transition region characteristics, along an enlarged two dimensional turbine airfoil model in cascade. The flow provided a range of blade chord Reynolds numbers from 790,000 to 1,500,000 at turbulence levels of 0.6 to 0.8%. A continuous, subsonic cascade facility was constructed for the study. High speed motion pictures of the trailing edge vortices showed periods of time during which vortex motion ceased and a fully turbulent wake existed. These periods occurred more often as the Reynolds number increased. It would appear that this wake change may reflect the intermittency of the pressure surface boundary layer near the trailing edge. A pressure surface transition region was found to exist from about $s/C = 0.43$ to the trailing edge. Dissert. Abstr.

N79-12007 Stanford Univ., Calif.
FEATURES OF A WAKE TONE FLOW FIELD Ph.D. Thesis
Charles Arthur Smith 1978 160 p
Avail: Univ. Microfilms Order No. 7822575

An experimental investigation of a two dimensional model of the interaction of a bluff body wake with a rigid surface examined the changes in the flow field associated with changes in the sound generated. Measurements were made of the acoustical characteristics and of the mean and fluctuating flow fields. This type of interaction was characterized by three separate flow regimes. The first occurred when the interacting body was in the very near wake. In this regime, the wake shear layers did

not interact and no discrete sound was generated. The second regime occurred when the interacting body was further downstream. Here the shear layers interacted with one another to form an alternating row of vortices. The result was a discrete tone (a wake tone) of very high amplitude. There was a sharp transition between the first two regimes. The third regime was characterized by the interacting body at an infinite downstream distance. Dissert. Abstr.

N79-12008 Stanford Univ., Calif.
TRANSIENT MOTION OF AN AIRFOIL: AN EXPERIMENTAL INVESTIGATION IN A SMALL SUBSONIC WIND TUNNEL Ph.D. Thesis
Stephen Michael Rock 1978 190 p
Avail: Univ. Microfilms Order No. 7822568

An experimental apparatus was constructed which was an accurate approximation to the ideal two degree-of-freedom typical section. It was unique, since there was no coupling of modes through its suspension and negligible friction in its constraints on extraneous degrees-of-freedom. It is shown that the theoretical predictions of natural frequencies and damping ratios characteristic of this apparatus agree with experimentally measured values within 2% throughout the subcritical (stable) operating airspeed range. Aerodynamic lift and moment expressions previously developed for an airfoil oscillating in a wind tunnel (incompressible flow) were developed in a form identical to the equations describing free flight. These more convenient expressions were generalized to include arbitrary airfoil motion, and were then used to write equations of motion for the ideal two degree-of-freedom typical section. Dissert. Abstr.

N79-12009 Dartmouth Coll., Hanover, N.H.
A PREDICTION OF THE INTERACTION OF A NORMAL SHOCK WITH A SEPARATING, TURBULENT BOUNDARY LAYER Ph.D. Thesis
William Jeffrey Klemm 1978 222 p
Avail: Univ. Microfilms Order No. 7822034

Analytical and numerical investigations were performed at various levels of sophistication to determine what may be learned about the interaction from each. Examination of the interaction literature revealed contradictions and misunderstandings that were resolved. One dimensional analysis showed the effect of the interaction on the pressure downstream. Quasi-two dimensional inviscid methods were used to predict the possible configurations for the splitting of a lambda shock. The combination of several viscous and inviscid quasi-two dimensional relations was used to calculate an interaction with reasonable accuracy and rapidity. Fully two dimensional equations were shown to require extensive, time-consuming iteration for solution (as for the full Navier-Stokes equations). Dissert. Abstr.

N79-12010 Virginia Polytechnic Inst. and State Univ., Blacksburg.
NONLINEAR STEADY AND UNSTEADY AERODYNAMICS OF WINGS AND WING-BODY-COMBINATIONS Ph.D. Thesis
Essam Hamed Atta 1978 129 p
Avail: Univ. Microfilms Order No. 7822718

A modified vortex lattice method was developed to solve the nonlinear, three dimensional, unsteady, incompressible flow over delta wings. Symmetric motions (pitching, heaving) and asymmetric motions (roll, yaw) were considered. Then the method was generalized to treat the nonlinear three dimensional steady flow for bodies and wing body combinations. Numerical examples included a variety of shapes and comparison with existing experimental data, and other numerical methods over a wide range of angle of attack showed good agreement. For bodies alone, the results deteriorated downstream of the separation region, while for wing-body combinations, the agreement with the experimental data was good, as long as the body separation effect was not large. Dissert. Abstr.

N79-12011*# Virginia Univ., Charlottesville. Dept. of Mechanical and Aerospace Engineering.
PRESSURE AND VELOCITY MEASUREMENTS IN A THREE DIMENSIONAL WALL JET
G. D. Catalano, J. B. Morton, and R. R. Humphris 9 Apr. 1978 35 p refs Backup document for AIAA Synoptic scheduled for publication in AIAA Journal in Feb. 1979 Sponsored in part by NSF
(Grant NGR-47-005-219)
(NASA-CR-157918) Avail: NTIS HC A03/MF A01 CSCL 01A

A flat plate and a curved wall surface, intended to model a wing-flap combination in a high V/STOL configuration, were used to measure pressure and flow velocity in a freely expanding coflowing jet and a three dimensional wall jet. The effects of increasing the velocity ratio of the jet exit plane velocity to the free stream velocity were investigated. Velocity measurements were made using a two color laser Doppler velocimeter with a phase-locked loop processor. Fluctuating pressures were monitored with condenser-type microphones. Quantities measured include the width of the mixing region, the mean velocity field, turbulent intensities, and time scales. Wall and static pressure-velocity correlations and coherences are presented. A.R.H.

N79-12012# Battelle Columbus Labs., Ohio.
BASE PRESSURES ON AN AXISYMMETRIC TRANSONIC FLOW PAST A BACKWARD FACING STEP
J. S. K. Liu and W. L. Chow (Illinois Univ. at Urbana Champaign) 21 Nov. 1978 43 p refs Backup document for AIAA Synoptic, "Axisymmetric Transonic Turbulent Base Pressure", scheduled for publication in AIAA Journal in Mar. 1979
(Grant DAAG-76-G-0199)
Avail: NTIS HC A03/MF A01

The viscid-inviscid interaction governing this problem is interpreted by regarding the inviscid flow field as if it were produced for an equivalent inviscid body whose geometrical description relies upon some characteristic parameters and the correct values of these parameters are to be determined through the viscous flow analysis. Inviscid flow field is established by solving the full axisymmetric potential equation by the numerical method of relaxation and the viscous flow is studied with an integral approach. It is found that the reattachment point behaves as a saddle point singularity for the system of equations describing the recompressive viscous flow processes. Extensive calculations were carried out to investigate the influence of the initial momentum thickness of the boundary layer prior to separation, the size of the sting, the shape of inviscid equivalent body geometry, and the spread rate parameter within the turbulent jet mixing region. The base pressure decreased rapidly as the free stream approached sonic Mach number. G.G.

N79-12013*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
APPLICATION OF SHOCK TUBES TO TRANSONIC AIRFOIL TESTING AT HIGH REYNOLDS NUMBERS
William J. Cook (Iowa State Univ.), Michael J. Chaney (Iowa State Univ.), Leroy L. Presley, and Gary T. Chapman Nov. 1978 69 p refs
(NASA-TP-1268; A-6855) Avail: NTIS HC A04/MF A01 CSCL 01A

Performance analysis of a gas-driven shock tube shows that transonic airfoil flows with chord Reynolds numbers of the order of 100 million can be produced, with limitations being imposed by the structural integrity of the facility or the model. A study of flow development over a simple circular arc airfoil at zero angle of attack was carried out in a shock tube at low and intermediate Reynolds numbers to assess the testing technique. Results obtained from schlieren photography and airfoil pressure measurements show that steady transonic flows similar to those produced for the same airfoil in a wind tunnel can be generated within the available testing time in a shock tube with properly contoured test section walls. G.G.

N79-12014*# General Dynamics/Fort Worth, Tex.
EXPERIMENTAL INVESTIGATION OF A 0.15-SCALE MODEL OF AN UNDERFUSELAGE NORMAL-SHOCK INLET Final Report
P. C. Leamer and I. G. Kennon 1978 332 p refs
(Contract NAS3-21139)
(NASA-CR-3049) Avail: NTIS HC A15/MF A01 CSCL 01A

A 0.15 scale model of an underfuselage inlet designed for a single-engine fighter airplane was tested. The inlet was a fixed-geometry, normal-shock configuration designed to operate at flight speeds up to Mach 2.0. Peformance data for the basic inlet and several configuration variations are presented as a

function of angle of attack, angle of sideslip, and airflow in the 0.6 to 2.0 Mach number range. The configuration variations included boundary-layer diverter height, cowl and splitter-plate modifications, and inlet bleed system variations. Flow-field characteristics at the simulated engine face, at the inlet throat, at the splitter-plate leading edge, and forward of the inlet are presented. The pressure recovery of the inlet is approximately equal to the product of theoretical normal-shock and duct pressure recoverable at cruise angle of attack. Very good performance at high angle of attack was obtained. Pressure distortion and turbulence at the engine face were low, and the inlet remained stable at all engine airflows over the flight maneuver envelope of the aircraft for which the inlet was designed. G.G.

N79-12015*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

EFFECT OF ROTOR TIP CLEARANCE AND CONFIGURATION ON OVERALL PERFORMANCE OF A 12.77-CENTIMETER TIP DIAMETER AXIAL-FLOW TURBINE

Jeffrey E. Haas (Army Aviation Research and Development Command) and Milton G. Kofskey 1978 14 p refs To be presented at 24th Ann. Intern. Conf., San Diego, Calif., 11-15 Mar. 1979; sponsored by Am. Soc. of Mech. Engr.

(NASA-TM-79025; E-9181-1; AVRADCOM-TR-78-54) Avail: NTIS HC A02/MF A01 CSCL 01A

The rotor tip clearance was obtained by use of a recess in the casing above the rotor blades and also by use of a reduced blade height. For the recessed casing configuration, the optimum rotor blade height was found to be the one where the rotor tip diameter was equal to the stator tip diameter. The tip clearance loss associated with this optimum recessed casing configuration was less than that for the reduced blade height configuration. G.G.

N79-12016*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

WIND TUNNEL TESTS OF A BLADE SUBJECTED TO MIDCHORD TORSIONAL OSCILLATION AT HIGH SUBSONIC STALL FLUTTER CONDITIONS

D. R. Boldman and A. E. Buggele Oct. 1978 33 p refs

(NASA-TM-78998; E-9782) Avail: NTIS HC A03/MF A01 CSCL 01A

A mechanical drive system for oscillating blades in a wind tunnel at frequencies up to 767 hertz and amplitudes of + or - 1.2 deg is described. High-speed motion pictures of schlieren images of the flow over a double-circular arc blade oscillating in harmonic motion about the midchord revealed extensive shock patterns at a nominal free stream Mach number of 0.7, a mean angle of attack of 4 deg, and reduced frequency of about 0.7. A phase lag resulting from the slow response of the flow to the motion of the blade increased with increasing reduced frequency. This phase lag, based on the difference between the time the blade attained its maximum angle of attack and the time required for the normal shock to reach its extreme downstream position, was nominally 100 deg at the above conditions. Author

N79-12017*# National Aeronautics and Space Administration, Washington, D. C.

FLOW-FIELD IN A VORTEX WITH BREAKDOWN ABOVE SHARP EDGED DELTA WINGS

Yoshio Hayashi and Teruomi Nakaya Nov. 1978 117 p refs Transl. into ENGLISH of "Breakdown o Tomonau Sankaku-Yoku Zen-En Hakuri Uzu no Nagareba", Rept. NAL-TR-423 Natl. Aerospace Lab., Tokyo, Aug. 1975 46 p Translation was announced as N76-21157 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-3199)

(NASA-TM-75339; NAL-TR-423) Avail: NTIS HC A06/MF A01 CSCL 01A

The behavior of vortex-flow, accompanied with breakdown, formed above sharp-edged delta wings, was studied experimentally as well as theoretically. Emphasis is placed particularly on the criterion for the breakdown at sufficiently large Reynolds numbers G.G.

N79-12018*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

EXPERIMENTAL INVESTIGATION OF WING FIN CONFIGURATIONS FOR ALLEVIATION OF VORTEX WAKES OF AIRCRAFT

Vernon J. Rossow Nov. 1978 38 p refs

(NASA-TM-78520; A-7593) Avail: NTIS HC A03/MF A01 CSCL 01A

A variety of fin configurations were tested on a model of the Boeing B747 in 40 by 80 foot wind tunnels. The test results confirmed that a reduction in wake rolling moment was brought about by the vortex shed by the fins so that a wide range of designs can be used to achieve wake alleviation. It was also found that the reduction in wake-induced rolling moments was especially sensitive to the location of the smaller fins on the wing and that the penalties in lift and drag can probably be made negligible by proper fin design. J.A.M.

N79-12019*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

COMPREHENSIVE HELICOPTER ANALYSIS: A STATE OF THE ART REVIEW

Wayne Johnson Nov. 1978 18 p refs Prepared in cooperation with Army Aviation Research and Development Command, Moffett Field, Calif.

(NASA-TM-78539; AVRADCOM-78-56(AM); A-7661) Avail: NTIS HC A02/MF A01 CSCL 01A

An assessment of the status of helicopter theory and analysis is presented. The technology level embodied in available design tools (computer programs) is examined, considering the problem areas of performance, loads and vibration, handling qualities and simulation, and aeroelastic stability. The effectiveness of the present analyses is discussed. The characteristics of the technology in the analyses are reviewed, including the aerodynamics technology, induced velocity and wake geometry, dynamics technology, and machine limitations. Author

N79-12020*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

AN APPROACH TO OPTIMUM SUBSONIC INLET DESIGN

R. W. Luidens, N. O. Stockman, and J. H. Diedrich 1978 14 p refs Proposed for presentation at the 24th Ann. Intern. Gas Turbine Conf. and 1st Solar Energy Conf., 11-15 Mar. 1979; sponsored by Am. Soc. of Mech. Engr.

(NASA-TM-79051; E-9860) Avail: NTIS HC A02/MF A01 CSCL 01A

Inlet operating requirements are compared with estimated inlet separation characteristics to identify the most critical inlet operating condition. This critical condition is taken to be the design point and is defined by the values of inlet mass flow, free-stream velocity and inlet angle of attack. Optimum flow distributions on the inlet surface were determined to be a high, flat top Mach number distribution on the inlet lip to turn the flow quickly into the inlet and a flat bottom skin-friction distribution on the diffuser wall to diffuse the flow rapidly and efficiently to the velocity required at the fan face. These optimum distributions are then modified to achieve other desirable flow characteristics. Example applications are given. G.G.

N79-12021*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

CANARD-BODY-TAIL MISSILE TEST AT ANGLES OF ATTACK TO 50 DEG IN THE AMES 11-FOOT TRANSONIC WIND TUNNEL

Clyde Q. Allen, Richard G. Schwind (Nielsen Eng. and Res., Inc., Mountain View, Calif.), and Gerald N. Malcolm Sep. 1978 1217 p refs

(NASA-TM-78441) Avail: NTIS HC A99/MF A01 CSCL 01A

Blunted ogive cylinder missile models with a length-to-diameter ratio of 10.4 were tested at transonic speeds and large angles of attack in an 11 foot transonic wind tunnel. The configurations are: body, body with tail panels, body with canards, and body with canards and tails. Forces and moments from the entire model and each of the eight fins were measured over the pitch range of 20 deg to 50 deg, and roll angles of 0 deg to 45 deg and canard deflection angles between 0 deg and 15 deg. The Reynolds number ranged from 3.9 x 10 to the 6th power per meter. Large side forces and yawing moments were observed for some of the test cases involving a symmetric geometry. B.B.

N79-12022# McDonnell-Douglas Research Labs., St. Louis, Mo.
COMPRESSIBLE VISCOUS FLOWFIELDS AND AIRFRAME FORCES INDUCED BY TWO-DIMENSIONAL LIFT JETS IN GROUND EFFECT Interim Technical Report, 1 Feb. 1977 - 28 Feb. 1978
W. W. Bower 1 Mar. 1978 111 p refs
(Contract N00014-76-C-0494; RR0141184)
(AD-A059231; ONR-CR-215-246-2) Avail: NTIS HC A06/MF A01 CSCL 20/4

The interaction of the lift jets and the ground is an important consideration with regard to the design of VTOL aircraft. A key element of this ground effect problem is turbulent jet entrainment, which causes otherwise static air to be set into motion and leads to aerodynamic loads on airframe surfaces. To gain a better understanding of this phenomenon, a theoretical analysis of two-dimensional (planar) compressible turbulent jet impingement flowfields has been undertaken. Lift jets emanating from flat and curved surfaces in close ground effect have been modeled using the compressible Reynolds equations in combination with a one-equation turbulence model. Distributions of the flow properties are computed as functions of the Reynolds, Prandtl, and Froude numbers and height of the jet exit plane above ground. Author (GRA)

N79-12023# Dayton Univ., Ohio.
THE AEROELASTIC ANALYSIS OF A TWO-DIMENSIONAL AIRFOIL IN TRANSONIC FLOW Final Report, Jul. 1977 - Sep. 1977
Donald P. Rizzeta Dec. 1977 56 p refs
(Contract F33615-76-C-3146; AF Proj. 2307)
(AD-A057505; AFFDL-TR-77-126) Avail: NTIS HC A04/MF A01 CSCL 20/4

A procedure is developed for the aeroelastic analysis of a two-dimensional airfoil in transonic flow. The fluid is assumed to be described by the unsteady low frequency small disturbance transonic potential equation for which a fully time implicit method of integration (LTRAN2) exists. Structural equations of motion for a three degree of freedom NACA 64A010 airfoil are integrated in time simultaneously with the unsteady potential equation using representative values of the structural parameters. The method is shown to be both stable and accurate, and the time response for several choices of initial conditions and reduced freestream density is presented. Oscillations with either increasing or decreasing amplitudes are found to result solely from the choice of initial conditions. Author (GRA)

N79-12024# Naval Postgraduate School, Monterey, Calif.
TETHERED BALLOON TRANSPORT SYSTEM: A PROPOSAL M.S. Thesis
William Frederick Graeter, II Jun. 1978 230 p refs
(AD-A057341; NPS-54-78-062) Avail: NTIS HC A11/MF A01 CSCL 15/5

This report documents the impact of containerization on amphibious warfare, reviews the state of current lighter-than-air technology, traces the development of the commercial Balloon Transport System, summarizes the military development efforts at discharging containers using a balloon transport system, and makes specific recommendations for the implementation and further development of a Navy Balloon Transport Facility (NBTF) which is designed to remove containers from non-self-sustaining containerships, transport them to the shore and deposit them in staging/handling areas inside the amphibious area of operations. Author (GRA)

N79-12025# Air Force Geophysics Lab., Hanscom AFB, Mass.
FLIGHT TESTS OF THE AIR-LAUNCHED BALLOON SYSTEM (ALBS) PROTOTYPE MODEL Final Report
Andrew S. Carten, Jr. 23 Mar. 1978 131 p
(AD-A057610; AFGL-TR-78-0074; AFGL-IP-267) Avail: NTIS HC A07/MF A01 CSCL 01/3

The requirements for the Air Launched Balloon System (ALBS) development program and the highlights of that program, prior to the flight test phase, are presented. The rationale behind an ambitious ALBS parachute subsystem test flight series, using C-130 aircraft, at the National Parachute Test Range is given, along with the initial system configuration chosen for that series. The test-demonstrated inadequacy of the 32-ft drogue chute is documented. The successes achieved subsequently in flights with a 28-ft drogue chute (in combination with the 42-ft main chute) are described, both for tests employing a dummy balloon and for later tests in which a real balloon was used. Attempts at partial balloon inflation at the NPTR are discussed. The unsolved parachute coning problem is also described, along with tests aimed at its solution. Planning and preflight preparations for the January 1978 balloon drop test over the White Sands Missile Range are covered in considerable detail. The abortive launch of that flight is related and an analysis of the reasons for the flight failure is presented. Five (5) appendices are included with supporting calculations. Author (GRA)

N79-12026# Center for Naval Analyses, Arlington, Va.
ASSESSMENT OF SELECTED LIGHTER-THAN-AIR VEHICLES FOR MISSION TASKS OF THE US COAST GUARD Final Report, Jun. 1975 - Aug. 1977
Ralph E. Beatty, Jr. and Richard D. Linnel May 1978 788 p
(Contract N00014-68-A-0091-0025)
(AD-A058237; CNS-1078; USCG-D-39-78) Avail: NTIS HC A99/MF A01 CSCL 01/3

This study examines the role of lighter-than-air (LTA) vehicles in performing several United States Coast Guard missions including enforcement of laws and treaties, marine environmental protection, and search and rescue. Reconnaissance tasks required for surveillance of the 200 mile coastal economic zones are emphasized. Before assessing how well LTA vehicles performed these missions, basic lighter-than-air craft needed to be designed. The study develops a conceptual design model to estimate the characteristics of a family of modern airships with varying range and speed. All the LTAs considered are semibuoyant hybrids that use aerodynamic lift to increase fuel capacity. The effect of different design features (such as envelope material, engine type, and design altitude) are also investigated. The family of LTAs is compared with existing and proposed Coast Guard vehicles that were previously examined in the CNA study (no. 1061) of hydrofoils for the Fisheries Law Enforcement mission of the U.S. Coast Guard. The comparisons, based on cost and effectiveness in patrol tasks, are made by evaluating miles and square miles on station per dollar. For trail tasks, the measure used to compare vehicles is hours on station per dollar. Some comparison of how efficiently vehicles consumed fuel is also made.
Author (GRA)

N79-12027# Grumman Aerospace Corp., Bethpage, N.Y.
AN AUTOMATED PROCEDURE FOR COMPUTING THE THREE-DIMENSIONAL TRANSONIC FLOW OVER WING-BODY COMBINATIONS, INCLUDING VISCOUS EFFECTS. VOLUME 2: PROGRAM USER'S MANUAL AND CODE DESCRIPTION Final Report, May 1975 - Oct. 1977
William H. Mason, Donald Mackenzie, Mark Stern, William F. Ballhaus, and Juanita Frick Wright-Patterson AFB, Ohio AFFDL Feb. 1978 476 p refs
(Contract F33615-75-C-3073; AF Proj. 1476)
(AD-A054998; AFFDL-TR-77-122-Vol-2) Avail: NTIS HC A21/MF A01 CSCL 01A

This volume provides the detailed information required to use the program described in Volume 1 of this report. This includes a description of the input data set, and the output results. A complete sample case is included in order to illustrate the use of the program. The full details of the method are described in Volume 1, however, a brief description of the method is provided. The program is a numerical method that predicts the detailed pressure distribution on wing-body combinations at transonic Mach numbers less than one and integrates the pressures to obtain aircraft force and moment data. The code has been developed with the intent of providing the user with an easy to use and reliable tool. The basic inviscid prediction method is the modified transonic small disturbance theory program. In order to provide accurate surface pressure predictions on the wing, several additional features of the typical transonic flowfield have been incorporated. These consist of the viscous displacement effect, local strong viscous interaction at the shock wave foot and at the trailing edge (including an approximate treatment of local shallow separations), and finally, the interaction effect of the fuselage. GRA

N79-12028# Advisory Group for Aerospace Research and Development, Paris (France).

TECHNICAL EVALUATION REPORT ON THE FLUID DYNAMICS PANEL SYMPOSIUM ON UNSTEADY AERODYNAMICS
H. Bergh (Natl. Aerospace Lab., Amsterdam) Oct. 1978 8 p Symp. held at Ottawa, 26-28 Sep. 1977
(AGARD-AR-128; ISBN-92-835-1300-2) Avail: NTIS HC A02/MF A01

The proceedings of a symposium on unsteady aerodynamics are presented and the following topics are discussed: (1) unsteady subsonic and supersonic flow; (2) unsteady transonic flow; (3) unsteady nonseparated and separated boundary layers; (4) viscous-inviscid interactions, dynamic stall; and (5) unsteady flows associated with rotors, cascades, and turbomachinery. B.B.

N79-11997 European Space Agency, Paris (France).
A NEW METHOD FOR CORRECTING TWO-DIMENSIONAL WALL INTERFERENCE
Claude Capelier (ONERA), Jean-Pierre Chevallier (ONERA), and Fernand Bouniol (ONERA) *In its* La Rech. Aerospatiale, Bi-monthly Bull. No. 1978-1 (ESA-TT-491) Aug. 1978 p 1-30 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1978-1, Jan.-Feb. 1978 p 1-11 Presented at the 14th Applied Aerodyn. Colloq., Toulouse, 7-9 Nov. 1977 Original report in FRENCH previously announced as A78-32035 (For primary document see N79-11996 03-01)
HC A06/MF A01

N79-12000 European Space Agency, Paris (France).
AN EXPERIMENTAL STUDY OF THE DYNAMIC FORCES ACTING ON AN AEROFOIL
Edmond Szechenyi (ONERA) *In its* La Rech. Aerospatiale, Bi-monthly Bull. No. 1978-1 (ESA-TT-491) Aug. 1978 p 97-112 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1978-1, Jan.-Feb. 1978 p 41-47 Presented at the 3d European Forum on Rotating Airfoils and Dyn. Lift, Aix-en-Provence, France, 7-9 Sep. 1977 Original report in FRENCH previously announced as A77-50995 (For primary document see N79-11996 03-01)
HC A06/MF A01

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N79-12029*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CONFERENCE ON FIRE RESISTANT MATERIALS (FIREMEN): A COMPILATION OF PRESENTATIONS AND PAPERS
Demetrius A. Kourtides, ed. Oct. 1978 508 p refs Conf. held at Ames Res. Center, Moffett Field, Calif., 13-14 Apr. 1978
(NASA-TM-78523; A-7605) Avail: NTIS HC A23/MF A01 CSCL 13L

The proceedings of the NASA Fire Resistant Materials Engineering (FIREMEN) Program held at Ames Research Center on April, 13, 14, 1978 are reported. The purpose of the conference was to discuss the results of NASA in the field of aircraft fire safety and fire resistant materials. The program components include the following: (1) large-scale testing; (2) fire toxicnlogy; (3) polymeric materials; and (4) bibliography related and/or generated from the program. For individual titles, see N79-12030 through N79-12047.

N79-12030*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE 737 AIRCRAFT FLAMMABILITY TESTING
Richard W. Bricker *In* NASA. Ames Res. Center Conf. on Fire Resistant Mater. (FIREMEN) Oct. 1978 p 14-38 (For primary document see N79-12029 03-03)
Avail: NTIS HC A23/MF A01 CSCL 13L

The FAA requested approximately 20 component and full-scale tests in a 737 fuselage to provide validation data or indicate changes that need to be made to a fire math model (Dayton Aircraft Cabin Fire Model) developed for the FAA. Some preliminary tests were conducted to evaluate the adequacy of planned instrumentation. The objectives of the program were met in that it was verified that propagation of a fire could be determined from the sequential response of thermocouples located on a test specimen(such as a seat), and continuous weighing of the specimen during the test was accomplished. Two differenct techniques for measuring smoke density were found to be comparable. Author

N79-12031*# Douglas Aircraft Co., Inc., Long Beach, Calif.
DOUGLAS AIRCRAFT CABIN FIRE TESTS
David Klinck *In* NASA. Ames Res. Center Conf. on Fire Resistant Mater. (FIREMEN) Oct. 1978 p 39-68 (For primary document see N79-12029 03-03)
Avail: NTIS HC A23/MF A01 CSCL 13L

Program objectives are outlined as follows: (1) examine the thermal and environmental characteristics of three types of fuels burned in two quantities contained within a metal lavatory; (2) determine the hazard experienced in opening the door of a lavatory containing a developed fire; (3) select the most severe source fuel for use in a baseline test; and (4) evaluate the effect of the most severe source upon a lavatory constructed of contemporary materials. All test were conducted in the Douglas Cabin Fire Simulator. Author

N79-12032*# Boeing Commercial Airplane Co., Seattle, Wash.
FIRE TESTING IN THE BOEING 707 CABIN SECTION
Everett A. Tustin *In* NASA. Ames Res. Center Conf. on Fire Resistant Mater. (FIREMEN) Oct. 1978 p 69-96 (For primary document see N79-12029 03-03)
Avail: NTIS HC A23/MF A01 CSCL 13L

The goal of a FIREMEN funded contract is the definition of a laboratory test method ranking airplane interior materials by probable performance in post-crash and in-flight fires. A major task is the relation of laboratory results to full scale data. A large test facility for testing materials to the thermal threat of fuel fed and interior fires was developed with quartz lamps and a propane burner in a twenty foot fuselage section. A method was developed to analyze full scale data for the apparent heat, smoke and toxicant release rates of the material tested. Author

N79-12033*# Boeing Commercial Airplane Co., Seattle, Wash.
DEVELOPMENT OF LIGHTWEIGHT, FIRE-RETARDANT, LOW SMOKE, HIGH STRENGTH, THERMALLY STABLE AIRCRAFT FLOOR PANELING
Roy A. Anderson and Richard T. Karch *In* NASA. Ames Res. Center Conf. on Fire Resistant Mater. (FIREMEN) Oct. 1978 p 97-124 (For primary document see N79-12029 03-03)
Avail: NTIS HC A23/MF A01 CSCL 13L

Boeing's participation in a NASA funded program (FIREMEN) to develop materials for use as floor panels possessing flammability, smoke and toxicity characteristics superior to current materials is outlined. The objectives of the program are to develop an aircraft floor paneling suitable for high traffic areas, e.g., aisle or galley and to install and certify the panel in a commercial aircraft for service evaluation. Author

N79-12034*# Lockheed-California Co., Burbank.
THERMOPLASTICS FOR AIRCRAFT INTERIORS
Bernard Silverman *In* NASA. Ames Res. Center Conf. on Fire Resistant Mater. (FIREMEN) Oct. 1978 p 125-134 (For primary document see N79-12029 03-03)
Avail: NTIS HC A23/MF A01 CSCL 13L

The goal for this contract is the development of processes and techniques for molding thermally stable, fire retardant, low smoke emitting polymeric materials. Outlined in this presentation are: (1) the typical molding types; (2) a program schedule; (3) physical properties of molding types with the test methods to be used; (4) general properties of injection molding materials; and (5) preliminary materials selection. G.Y.

N79-12035*# National Aeronautics and Space Administration, Washington, D. C.
FIRE TOXICOLOGY FROM THE NATIONAL ACADEMY OF

SCIENCES (NAS) POINT OF VIEW
David L. Winter *In* NASA. Ames Res. Center Conf. on Fire Resistant Mater. (FIREMEN) Oct. 1978 p 137-148 (For primary document see N79-12029 03-03)
Avail: NTIS HC A23/MF A01 CSCL 06T

At the request of NASA the Subcommittee on Fire Toxicology undertook the tasks of evaluating the state-of-knowledge in fire toxicology and recommending guidelines for establishing standard approaches for testing the toxicity of polymeric materials in fires. The recommended guidelines on methodology for evaluation of toxicity of pyrolysis and combustion products are presented. Flow charts reflecting the organizations responsible for the evaluation tasks are presented to show organizational changes which took place between 1977 and 1978. Also listed are the names, phone numbers and companies in attendance at the meeting. G.Y.

N79-12036*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
FIRE TOXICOLOGY PROGRAM. JSC METHODOLOGY
H. Schneider and D. Bafus *In* NASA. Ames Res. Center Conf. on Fire Resistant Mater. (FIREMEN) Oct. 1978 p 149-158 (For primary document see N79-12029 03-03)
Avail: NTIS HC A23/MF A01 CSCL 06T

Toxicological testing of spacecraft materials was initiated in 1965. Toxicological evaluations of the pyrolysis/combustion products of candidate spacecraft materials were performed using a modified 142 liter Bethlehem Chamber equipped with a Linberg Model 55031 furnace external to the chamber. In all of the assessments, lethality was chosen as the endpoint. A new pyrolysis/combustion chamber was developed for toxicological testing and ranking of both spacecraft and aircraft materials. The pyrolysis/combustion chamber permits the use of both behavior and physiological measurements as indicators of incapacitation. Methods were developed which employ high resolution gas chromatography/mass spectrometry to generate chamber atmospheric profiles which indicate the reproductibility of pyrolysate concentrations. The atmospheric volatile profiles in combination with CO, CO2, and O2 analysis indicates that small chamber equipped with an internal furnace will give reproducible results. G.Y.

N79-12037*# Southwest Foundation for Research and Education, San Antonio, Tex.
BEHAVIORAL TECHNOLOGY AND ITS APPLICATION TO FIRE TOXICOLOGY RESEARCH
Dane M. Russo *In* NASA. Ames Res. Center Conf. on Fire Resistant Mater. (FIREMEN) Oct. 1978 p 159-180 refs (For primary document see N79-12029 03-03)
Avail: NTIS HC A23/MF A01 CSCL 06T

The application of behavioral technology to the toxicity testing of pyrolysis/combustion (P/C) products is discussed and two categories of behavioral tests commonly employed in fire toxicology programs are reviewed. Data are presented from a comparison of carbon monoxide (CO) induced incapacitation in rats performing in a rotating wheel or under a Sidmon free-operant schedule of shock avoidance. Rats performing in the rotating wheel were behaviorally incapacitated at CO concentrations and carboxyhemoglobin levels significantly lower than those which incapacitated operant avoidance animals. It is concluded that different measures of behavioral incapacitation may vary since incapacitation is a function of the particular toxic mechanism at work and the behavioral requirements of the specific task employed in the test procedure. Author

N79-12038*# SRI International Corp., Menlo Park, Calif.
SMOKE TOXICITY METHODOLOGY
J. V. Dilley, S. B. Martin, R. McKee, and G. Pryor *In* NASA. Ames Res. Center Conf. on Fire Resistant Mater. (FIREMEN) Oct. 1978 p 81-212 (For primary document see N79-12029 03-03)
Avail: NTIS HC A23/MF A01 CSCL 06T

The toxicity of pyrolysis products for aircraft interior materials must be within some reasonable limit. The toxicity of pyrolysis products from five candidate aircraft materials is evaluated. The most important part of this study was to demonstrate that pyrolysis of materials could be controlled and biological endpoints are reproducible. G.Y.

N79-12039*# Douglas Aircraft Co., Inc., Long Beach, Calif.
ANIMAL EXPOSURE DURING BURN TESTS
James G. Gaume *In* NASA. Ames Res. Center Conf. on Fire Resistant Mater. (FIREMEN) Oct. 1978 p 213-244 (For primary document see N79-12029 03-03)
Avail: NTIS HC A23/MF A01 CSCL 06C

An animal exposure test system (AETS) was designed and fabricated for the purpose of collecting physiological and environmental (temperature) data from animal subjects exposed to combustion gases in large scale fire tests. The AETS consisted of an open wire mesh, two-compartment cage, one containing an exercise wheel for small rodents, and the other containing one rat instrumented externally for electrocardiogram (ECG) and respiration. Cage temperature is measured by a thermistor located in the upper portion of the rat compartment. Animal activity is monitored by the ECG and the records indicate an increase in EMG (electromyograph) noise super-imposed by the increased activity of the torso musculature. Examples of the recordings are presented and discussed as to their significance regarding toxicity of fire gases and specific events occurring during the test. The AETS was shown to be a useful tool in screening materials for the relative toxicity of their outgassing products during pyrolysis and combustion. S.E.S.

N79-12040*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
OVERVIEW OF FIREMEN PROGRAM AT AMES RESEARCH CENTER
Demetrius A. Kourtides *In its* Conf. on Fire Resistant Mater. Oct. 1978 p 247-282 (For primary document see N79-12029 03-03)
Avail: NTIS HC A23/MF A01 CSCL 13L

The Ames Firemen Program is described. The key elements of the program include: (1) the development and evaluation of aircraft interior composite panels; (2) the thermochemical and flammability characterization of thermoset and thermoplastic resins; and (3) the evolution of fire resist aircraft seat components. The first two elements are presented. S.E.S.

N79-12041*# Boeing Commercial Airplane Co., Seattle, Wash.
DEVELOPMENT OF AIRCRAFT LAVATORY COMPARTMENTS WITH IMPROVED FIRE RESISTANCE CHARACTERISTICS
Roy A. Anderson and Gerald A. Johnson *In* NASA. Ames Res. Center Conf. on Fire Resistant Mater. (FIREMEN) Oct. 1978 p 283-362 (For primary document see N79-12029 03-03)
Avail: NTIS HC A23/MF A01 CSCL 13L

The Boeing's participation in a NASA-funded program (FIREMEN) included developing materials for use as lavatory wall panels, sidewall panels, and ceiling panels possessing flammability, smoke, and toxicity (FS&T) characteristics superior to current materials of construction is described. A sandwich panel system is developed for improving FS&T characteristics and acceptable cost, processing requirements, aesthetic qualities, abrasion resistance, strain resistance, scuff resistance, and washability. S.E.S.

N79-12042*# Hughes Aircraft Co., Culver City, Calif.
PHOSPHORYLATED EPOXY ADHESIVES
Norman Bilow *In* NASA. Ames Res. Center Conf. on Fire Resistant Mater. (FIREMEN) Oct. 1978 p 363-373 (For primary document see N79-12029 03-03)
Avail: NTIS HC A23/MF A01 CSCL 07C

Fire retardant adhesives for aircraft interiors are developed. Monomers, epoxy synthesis, diamine synthesis, acrylic modified epoxy, and phosphorylated amine epoxy blends are examined. S.E.S.

N79-12043*# Solar Turbines International, San Diego, Calif.
DEVELOPMENT OF FIRE-RESISTANT, LOW SMOKE GENERATING, THERMALLY STABLE END ITEMS FOR AIRCRAFT AND SPACECRAFT
John Gagliani *In* NASA. Ames Res. Center Conf. on Fire Resistant Mater. (FIREMEN) Oct. 1978 p 375-418 (For primary document see N79-12029 03-03)
Avail: NTIS HC A23/MF A01 CSCL 01C

A new approach to the problem of flammability by the use of materials obtained from foamy polyimide resins is developed.

The ability of these materials to provide fire protection is demonstrated. The development of processes for producing resilient cell foam for use in aircraft seating, thermal acoustical insulation, floor and wall panels, coated glass fabrics, and molded hardware. S.E.S.

N79-12044*# Douglas Aircraft Co., Inc., Long Beach, Calif.
FIRE RESISTANT AIRCRAFT SEAT MATERIALS
Edward L. Trabold *In* NASA. Ames Res. Center Conf. on Fire Resistant Mater. (FIREMEN) Oct. 1978 p 421-432 (For primary document see N79-12029 03-03)
Avail: NTIS HC A23/MF A01 CSCL 01C

The establishment of a technical data base for individual seat materials in order to facilitate materials selections is reviewed. The thermal response of multi-layer constructions representative of the basic functional layers of a typical future seat is examined. These functional layers include: (1) decorative fabric cover; (2) slip sheet (topper); (3) fire blocking layer; (4) cushion reinforcement; and (5) cushioning layer. The implications for material selection for full-scale seats are discussed. S.E.S.

N79-12045*# Massachusetts Inst. of Tech., Cambridge.
FABRICS FOR FIRE RESISTANT PASSENGER SEATS IN AIRCRAFT
Giuliana C. Tesoro *In* NASA. Ames Res. Center Conf. on Fire Resistant Mater. (FIREMEN) Oct. 1978 p 433-456 (For primary document see N79-12029 03-03)
Avail: NTIS HC A23/MF A01 CSCL 11E

The essential elements of the problem and of approaches to improved fire resistance in aircraft seats are reviewed. The performance requirements and availability of materials, delay in the ignition of upholstery fabric by a small source are considered a realistic objective. Results of experimental studies on the thermal response of fabrics and fabric/foam combinations suggest significant conclusions regarding: (1) the ignition behavior of a commercial 90/10 wool/nylon upholstery fabric relative to fabrics made from thermally stable polymers; (2) the role of the foam backing; (3) the behavior of seams. These results, coupled with data from other sources, also confirm the importance of materials' interactions in multicomponent assemblies, and the need for system testing prior to materials' selection. The use of an interlinear or thermal barrier between upholstery fabric and foam is a promising and viable approach to improved fire resistance of the seat assembly, but experimental evaluation of specific combinations of materials or systems is an essential part of the selection process. Author

N79-12046*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ENCLOSURE FIRE MODELING
Clifford D. Coulbert *In* NASA. Ames Res. Center Conf. on Fire Resistant Mater. (FIREMEN) Oct. 1978 p 457-477 refs (For primary document see N79-12029 03-03)
(Contract NAS7-100)
Avail: NTIS HC A23/MF A01 CSCL 13L

A fire characterization methodology is presented, which for the first time provides a unified analysis framework for the integration of all fire tests data on a common basis. Fire temperatures, smoke densities, toxic gas concentrations and heat fluxes to material properties, enclosure geometry, and ventilation factors are provided in this fire characterization approach. The fire characterization methodology was used to develop an enclosure fire hazards analysis procedure capable of predicting the probable course in fire prevention. S.E.S.

N79-12047*# Naval Ship Research and Development Center, Annapolis, Md.
MODEL FIRE TESTS ON POLYPHOSPHAZENE RUBBER AND POLYVINYL CHLORIDE (PVC)/NITRILE RUBBER FOAMS
William M. Widenor *In* NASA. Ames Res. Center Conf. on Fire Resistant Mater. (FIREMEN) Oct. 1978 p 479-491 (For primary document see N79-12029 03-03)
Avail: NTIS HC A23/MF A01 CSCL 07C

A video tape record of model room fire tests was shown, comparing polyphosphazene (P-N) rubber and polyvinyl chloride (PVC)/nitrile rubber closed-cell foams as interior finish thermal insulation under conditions directly translatable to an actual fire situation. Flashover did not occur with the P-N foam and only moderate amounts of low density smoke were formed, whereas with the PVC/nitrile foam, flashover occurred quickly and large volumes of high density smoke were emitted. The P-N foam was produced in a pilot plant under carefully controlled conditions. The PVC/nitrile foam was a commercial product. A major phase of the overall program involved fire tests on P-N open-cell foam cushioning. Author

N79-12048*# Douglas Aircraft Co., Inc., Long Beach, Calif.
STUDY TO DEVELOP IMPROVED FIRE RESISTANT AIRCRAFT PASSENGER SEAT MATERIALS, PHASE 2 Final Technical Report, 20 Sep. 1977 - 30 Jun. 1978
Fred E. Duskin, William H. Shook, Edward L. Trabold, and Howard H. Spieth [1978] 379 p refs
(Contract NAS2-9337)
(NASA-CR-152184) Avail: NTIS HC A17/MF A01 CSCL 01C

Fire tests are reported of improved materials in multilayered combinations representative of cushion configurations. Tests were conducted to determine their thermal, smoke, and fire resistance characteristics. Additionally, a source fire consisting of one and one-half pounds of newspaper in a tented configuration was developed. Finally, a preliminary seat specification was written based upon materials data and general seat design criteria. G.G.

N79-12049# Federal Aviation Administration, Washington, D. C.
ENGINEERING AND DEVELOPMENT PROGRAM PLAN: AIRCRAFT SAFETY
Jun. 1978 40 p
(AD-A058546; FAA-ED-18-1A) Avail: NTIS HC A03/MF A01 CSCL 01/3

The Aircraft Safety Program Engineering and Development Plan describes the objectives, the scope of work and the funding requirements to meet the Federal Aviation Administration's research need in aircraft safety for the 1978-85 period. The plan covers work in fire safety, transport safety, and general aviation aircraft safety. Author

N79-12050# Dayton Univ., Ohio. Research Inst.
DAYTON AIRCRAFT CABIN FIRE MODEL VALIDATION, PHASE 1 Final Report, Jun. 1976 - Nov. 1977
Charles D. MacArthur and John F. Myers Mar. 1978 141 p refs
(Contract DOT-FA74WA-3532)
(AD-A058547; UDRI-TR-78-44; FAA-RD-78-57) Avail: NTIS HC A07/MF A01 CSCL 01/3

Refinements were made to the Dayton University aircraft fire mathematical model following a comparison to seven full-scale cabin mock up fire tests. Changes include a generalization of the treatment of the cabin geometry to include of various widths, improved thermal radiation modeling, computation of oxygen consumption, and a treatment of forced ventilation. A laboratory testing program to acquire flammability, smoke, and gas generation data on the furnishing materials of the full-scale test is described. Based on the results of the comparisons, sections of the mathematical model which require further refinement are identified and some appropriate refinements are suggested. A.R.H.

N79-12051# Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
AERONAUTICAL SYSTEMS TECHNOLOGY NEEDS: ESCAPE, RESCUE AND SURVIVAL Annual Report, calendar year 1978
Donald C. Kittinger Apr. 1978 20 p Supersedes ASD-TR-77-2
(AD-A058208; ASD-TR-78-21; ASD-TR-77-2) Avail: NTIS HC A02/MF A01 CSCL 06/7

This report is a part of a compilation of formalized Technology Needs (TN) covering Equipment Subsystems as identified in the Aeronautical Systems Division. They are based on development/operational experience, systems studies and new concepts - all related to future system applications. Their presentation is to serve a threefold purpose; i.e., (1) guidance for technology program, (2) proven developmental potential, and (3) engineering data/requirements essential for technology use in systems. The identified needs delineate progress desired in performance, control, design flexibility, safety and cost. Author (GRA)

N79-12052# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
A STATISTICAL ANALYSIS OF SELECTED HUMAN FACTORS INVOLVED IN AVIATION SAFETY M.S. Thesis
James R. Berry and Samuel L. DeLoach Jun. 1978 81 p refs
(AD-A059284; AFIT-LSSR-6-78A) Avail: NTIS HC A05/MF A01 CSCL 01/2

This report presents a review of the biorhythm theory and performs a statistical analysis on over 2400 aviation accidents obtained from the Army Aviation Safety Center, Fort Rucker, Alabama. The analysis was performed to determine if there was a statistically significant relationship between aviation accident dates and biorhythm caution days. The Binomial Goodness-of-Fit Test was applied against the data. No significant relationship between the aviation accidents and biorhythm caution days was found. Author (GRA)

N79-12053# Mitre Corp., McLean, Va.
A SATELLITE-BASED SYSTEM FOR REDUNDANT MARITIME DISTRESS SIGNALING
Walter S. Scales Jul. 1978 49 p refs
(Contract MA-7-38024)
(PB-283960/2; M78-53) Avail: NTIS HC A03/MF A01 CSCL 06G

The loss of life and property in sudden maritime disasters represent a significant global problem. In many such disasters, no radio distress call is received. Emergency alerting via satellite is perceived as a cost-effective means of reducing the loss of life and property at sea. The suggested implementation combined the use of satellites in low polar orbit and geosynchronous satellites. This approach exhibited the advantages of immediate alerting (via geosynchronous satellite) with independent position determination (via low-orbiting satellite). GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications*.

N79-12054*# AVCON Aviation Consultants, Boulder, Colo.
OPERATIONAL REQUIREMENTS FOR FLIGHT CONTROL AND NAVIGATION SYSTEMS FOR SHORT HAUL TRANSPORT AIRCRAFT
John A. Morrison May 1978 90 p
(Contract NAS2-9028)
(NASA-CR-152208) Avail: NTIS HC A05/MF A01 CSCL 17G

To provide a background for evaluating advanced STOL systems concepts, a number of short haul and STOL airline operations in the United States and one operation in Canada were studied. A study of flight director operational procedures for an advanced STOL research airplane, the Augmented Wing Jet STOL Research Airplane, was conducted using the STOLAND simulation facility located at the Ames Changes to the advanced digital flight control system (STOLAND) installed in the Augmentor Wing Airplane are proposed to improve the mode sequencing to simplify pilot procedures and reduce pilot workload. S.B.S.

N79-12055# National Aviation Facilities Experimental Center, Atlantic City, N. J.
AN ANALYSIS OF RADIO NAVIGATION SENSOR ACCURACIES ASSOCIATED WITH AREA NAVIGATION (RNAV) Final Report, Sep. 1974 - Sep. 1976
Thomas V. Logue Aug. 1978 83 p
(FAA Proj. 044-326-500)
(AD-A058544; FAA-NA-77-45; FAA-RD-78-85) Avail: NTIS HC A05/MF A01 CSCL 17/7

Flight test data gathered during a series of RNAV flight tests are presented. Radio navigation sensor errors and the resulting errors in position determination are emphasized that are inherent in area navigation operation in the terminal area. Statistical data, as well as distributions of the errors, are presented. Also included is a comparison of the Advisory Circular 90-45A tangent point table calculated from regression equations. One standard deviation of 1.4 nautical miles for very high frequency omnidirectional radio range (VOR) and 0.11 nautical mile for distance measuring equipment (DME) were computed from the flight test data. These statistics represent combined ground and airborne sensor errors. G.G.

N79-12056# Federal Aviation Administration, Washington, D. C. ATC Systems Div.
ENGINEERING AND DEVELOPMENT PROGRAM PLAN: CENTRAL FLOW CONTROL SYSTEM
Aug. 1978 98 p refs
(AD-A058549; FAA-ED-11-1A) Avail: NTIS HC A05/MF A01 CSCL 17/7

The central flow control system is being developed as a centralized automated air traffic prediction management system. It regulates the flow of traffic to an airport, allows for ground holding delays, and minimizes airborne delays resulting in significant fuel savings and the smoothing of traffic flow to coincide with airport capacity. B.B.

N79-12057# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
MULTIFUNCTION INERTIAL REFERENCE ASSEMBLY TECHNOLOGY (MIRAT) SIMULATION DEVELOPMENT, CONFIGURATION EVALUATION, AND TEST PLAN DEVELOPMENT Final Report, 1 Feb. - 31 Dec. 1977
Paul Motyka, Roy Nurse, and Kevin Daly Wright-Patterson AFB, Ohio AFAL Mar. 1978 105 p refs
(Contract F33615-77-C-1103)
(AD-A057324; R-1135; AFAL-TR-78-33) Avail: NTIS HC A06/MF A01 CSCL 01/4

The significance of this research and development lies in the application of the developed simulation tools and techniques to the evaluation of potential Multifunction Inertial Reference Assembly (MIRA) sensor systems. These systems use a minimum number of inertial sensors to provide the inertial-reference information necessary to meet the aircraft requirements for weapon delivery, flight control, navigation, fire control, and flight safety. This contract considers development of real-time operation, and the addition of a navigation and attitude error-propagation algorithm. Other models added to the simulation are two-degree-of-freedom gyros, an air-data system, an autopilot, and a transport vehicle. Parametric studies and evaluations of potential MIRA configurations were conducted to support the definition of the long-term MIRA requirements, and to provide an independent evaluation of candidate configurations. The philosophy and details of a test and development plan, specifically geared to MIRA systems, are also discussed. GRA

N79-12058# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
FUNCTIONAL REQUIREMENTS OF THE INTERFACE BETWEEN THE NAVSTAR GPS RECEIVER MODEL X AND THE ADVANCED INERTIAL REFERENCE SPHERE, VOLUME 2 Final Report
Bernard A. Kriegsman, William M. Stonestreet, and Duncan B. Cox Dec. 1977 99 p refs
(Contract F04701-75-C-0212)
(AD-A057656; R-981-Vol-2; SAMSO-TR-77-120-Vol-2) Avail: NTIS HC A05/MF A01 CSCL 17/7

The performance requirements for the GPS X-set impose difficult and conflicting design problems on the receiver. To accurately track the incoming signals in a high-dynamics environment, a wide-bandwidth tracking loop is required with a high-order tracking network. For best performance in the presence of noise, on the other hand, a narrow bandwidth tracking loop is desired. Techniques for utilizing an Inertial Measurement Unit (IMU), such as the Advanced Inertial Reference Sphere (AIRS), to aid the receiver tracking loops are studied. The IMU can provide accurate information on translational accelerations and orientation changes experienced by the receiver. By properly using the IMU data, the receiver bandwidth can be reduced without increasing the dynamics-induced tracking error. The end result is an improvement in performance in noisy or jamming situations. GRA

N79-12059# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
FEASIBILITY STUDY OF GPS-INERTIAL NAVIGATION FOR HELICOPTERS AND STUDY OF ADVANCED GPS SIGNAL PROCESSING TECHNIQUES, VOLUME 3 Final Report, Nov. 1975 - Mar. 1978
Duncan B. Cox, Jr., Bernard A. Kriegsman, William M. Stonestreet, John Kishel, and Luigi V. Calicchia Mar. 1978 198 p refs (Contract F04701-75-C-0212)
(AD-A057659; R-981-Vol-3; SAMSO-TR-77-120-Vol-3) Avail: NTIS HC A09/MF A01 CSCL 17/7

This report is presented in two parts. Part 1 presents the results of a feasibility study of a low-cost integrated GPS-inertial (strapdown) navigation system for Army attack helicopters. The conclusion is reached that a GPS-Doppler navigation system can more easily attain the cost and performance goals. It was also concluded that an integrated GPS-Doppler-inertial system might be very attractive if it could be used for providing attitude and heading reference data as well as navigation data. There would be a cost savings association with avoiding the need for the usual attitude and heading reference systems. Moreover, the integrated GPS-Doppler-inertial system would have excellent performance in the presence of aircraft dynamics and jamming. Part 2 presents the results of a study of advanced GPS signal processing techniques. Covered in the study are data aiding, comparison of phase-locked loops with Costas loops, variable predetection bandwidths in code-tracking loops, code loop dithering, aided tracking, variable tracking bandwidths, and effective gains of detectors in the presence of noise. The results are from computer simulation and theoretical analysis.
Author (GRA)

N79-12490# Nottingham Univ. (England).
RETRIG AND EDOC: EUROPEAN TERRESTRIAL AND DOPPLER NETWORKS
V. Ashkenazi *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 119-125 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12509# Technische Univ., Berlin (West Germany).
SOME ASPECTS FOR SPACE-BASED NAVIGATION SYSTEMS
P. Hartl *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 281-285 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12510# Krupp Atlas-Elektronik, Bremen (West Germany).
MARINE NAVIGATION
Ingo Harre *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 287-288 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.
For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*.

N79-12060 Engineering Sciences Data Unit, London (England).
LOCAL BUCKLING AND CRIPPLING OF I, Z AND CHANNEL SECTION STRUTS
Jul. 1978 6 p
(ESDU-78020; ISBN-0-85679-222-5) For information on availability of series, sub-series, and other individual data items, write NTIS, Attn: ESDU, Springfield, Va. 22161. HC $146.50

All proportions of unlipped I, Z, and channel section struts of any length with flange to web thickness ratios from 0.5 to 4.0 manufactured from homogeneous isotropic materials are analyzed.
Author

N79-12061* National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
FREE WING ASSEMBLY FOR AN AIRCRAFT Patent
Chester H. Wolowicz, inventor (to NASA) Issued 7 Nov. 1978 9 p Filed 8 Sep. 1977 Supersedes N77-31135 (15 - 22, p 2894)
(NASA-Case-FRC-10092-1; US-Patent-4,124,180; US-Patent-Appl-SN-831634; US-Patent-Class-244-82; US-Patent-Class-244-48; US-Patent-Class-244-90R) Avail: US Patent and Trademark Office CSCL 01C

A free wing is attached to a fuselage of an aircraft in a manner such that the wing is free to pivot about a spanwise axis forward of its aerodynamic center. The wing is angularly displaced about the axis by aerodynamic pitching moments, resulting from lift, and is trimmed through a use of a trimmable free stabilizer comprising a floating canard mounted on a strut rigidly connected to the wing and projected forward from it.
Official Gazette of the U.S. Patent and Trademark Office

N79-12062*# National Aeronautics and Space Administration, Washington, D. C.
TECHNICAL PROBLEMS ENCOUNTERED WITH THE LALA-1 FLYING LABORATORY
J. Swidzinski Nov. 1978 27 p Transl. into ENGLISH from Tech. Lotnicza i Astronautyczna (Poland), v. 28, 1973 p 8-14 Original language document was announced as A73-26823 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-75585) Avail: NTIS HC A03/MF A01 CSCL 01C

A description is given of structural design changes necessitated by the conversion of the An-2R agricultural support aircraft into a flying test bed to be used in feasibility studies evaluating jet engines in agricultural support aircraft. The entire rear of the fuselage was radically modified to permit mounting of the AI-25 jet engine directly behind the trailing edge of the upper wing. The standard piston engine was retained to permit comparison between the two types of power plants in typical agricultural support operations.
Author

N79-12063*# National Aeronautics and Space Administration, Washington, D. C.
THE M-15 AIRCRAFT (SAMOLOT M-15)
R. Leiiecki Nov. 1978 11 p Transl. into ENGLISH from Biuletyn Informacyjny (Poland), v. 9, Nov. - Dec. 1972 p 5-6 Original language document was announced as A73-28026 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-75586) Avail: NTIS HC A02/MF A01 CSCL 01C

The M-15 is an all-metal, semimonocoque, twin-tail-boom sesquiplane aircraft designed exclusively for agricultural support operations involving slow low-level flight. It is powered by a single AI-25 bypass turbojet engine used in the Yak-40 aircraft. Tanks for spraying chemicals are mounted between the lower and upper wings. Dimensions, weights, and performance data are tabulated.
Author

N79-12064*# Kansas Univ. Center for Research, Inc., Lawrence.
INVESTIGATION OF THE CROSS-SHIP COMPARISON MONITORING METHOD OF FAILURE DETECTION IN THE HiMAT RPRV
James A. Wolf Dec. 1978 99 p refs
(Grant NSG-4012)
(NASA-CR-144879) Avail: NTIS HC A05/MF A01 CSCL 01C

The Highly maneuverable aircraft technology (HiMAT) remotely piloted research vehicle (RPRV) uses cross-ship comparison monitoring of the actuator RAM positions to detect a failure in the aileron, canard, and elevator control surface servosystems. Some possible sources of nuisance trips for this failure detection technique are analyzed. A FORTRAN model of the simplex servosystems and the failure detection technique were utilized to provide a convenient means of changing parameters and introducing system noise. The sensitivity of the technique to differences between servosystems and operating conditions was determined. The cross-ship comparison monitoring method presently appears to be marginal in its capability to detect an actual failure and to withstand nuisance trips.
G.G.

N79-12065*# Boeing Co., Wichita, Kans.
B-52B-008/DTV (DROP TEST VEHICLE) CONFIGURATION

1 (WITH AND WITHOUT FINS) FLIGHT TEST RESULTS - CAPTIVE FLIGHT AND DROP TEST MISSIONS
Delmar A. Quade 20 Oct. 1978 21 p refs
(Contract NAS8-31805)
(NASA-CR-150855; D3-11220-3) Avail: NTIS HC A02/MF A01 CSCL 01C

The B-52B-008 drop test consisted of one takeoff roll to 60 KCAS, two captive flights to accomplish limited safety of flight flutter and structural demonstration testing, and seven drop test flights. Of the seven drop test missions, one flight was aborted due to the failure of the hook mechanism to release the drop test vehicle (DTV); but the other six flights successfully dropped the DTV. Author

N79-12066*# General Dynamics/Fort Worth, Tex.
AERODYNAMIC CHARACTERISTICS OF FOREBODY AND NOSE STRAKES BASED ON F-16 WIND TUNNEL TEST EXPERIENCE. VOLUME 2: DATA BASE Final Report, 1 Sep. 1977 - 30 Sep. 1978
C. W. Smith and I. C. Bhateley Sep. 1978 757 p
(Contract NAS1-15006)
(NASA-CR-158922) Avail: NTIS HC A99/MF A01 CSCL 01C

The YF-16 and F-16 developmental wind tunnel test program was reviewed and all force data pertinent to the design of forebody and nose strakes extracted. A complete set of these data is presented without analysis. J.M.S.

N79-12067# Army Aviation Systems Command, St. Louis, Mo.
PROCEEDINGS OF THE TECHNICAL CONFERENCE ON THE EFFECTS OF HELICOPTER DOWNWASH ON FREE PROJECTILES
Nov. 1975 305 p refs Conf. held at Bridgetown, Mo., 12-14 Aug. 1975
(AD-A058123) Avail: NTIS HC A14/MF A01 CSCL 19/4

Partial contents: The Perturbed Flow Environment about Helicopters and its Effect on Free Rockets; Some Practical Aspects of Rotor Wake Effects on Rocket Accuracy; AH-1G Helicopter Field Flow Survey; Total QE Component Variation under Hover Downwash Conditions for Long Range Targets (3-6km); The Effects of Rotor-Wake on Rockets; Rotor-Wake Induced Flow along Helicopter Rocket Trajectories; Analysis of Effects of Calculated Downwash Distribution on Flight Performance of the 2.75 inch Rocket; Measurement of Helicopter Air Data Using Surveilling Pitot Static Pressure Probes; Correlation of Actual Induced Flow with Theory for Bell NUH-1M Helicopter Rotor Operating in Level Flight; Review of LORAS Characteristics; General Requirements for Omni Directional Low Range Airspeed System; LORAS Displays; Ultrasonic Wind Vector Sensor; Application of Remote Wind Sensors; Effects of Airflow on Jettison of Multi-Track Launchers from Helicopters; and VA 210-220 Series, Low Speed Indicator, 1 to 150k and Air Speed/Directional Sensor, 2 Axis, VT1003. GRA

N79-12068# Naval Ship Research and Development Center, Bethesda, Md. Aviation and Surface Effects Dept.
AN EXAMINATION OF THE FACTORS AFFECTING THE THRUST REQUIREMENTS AND THE HOVER AND SHORT TAKEOFF PERFORMANCE OF SEVERAL JET V/STOL FIGHTER CONCEPTS
Richard E. Kuhn May 1978 69 p refs
(zf61412001)
(AD-A058128; DTNSRDC/ASED-78/08) Avail: NTIS HC A04/MF A01 CSCL 01/3

A study of five jet vertical takeoff and landing fighter concepts was made considering height and attitude control, ground effect, ingestion losses, control bleed effects, installation losses, component weights, and short takeoff performance. A fixed gross weight of 35,000 pounds was assumed for each of the following concepts studied: Lift Plus Lift/Cruise; Lift/Cruise Plus Remote Burner; Lift/Cruise (bleed air for control); Vertical Attitude Takeoff and Landing, and Tilt Wing. Since total mission performance was not included in the study, no conclusion as to the 'best' concept is made, but rather some of the mission/concept tradeoffs are presented. Author (GRA)

N79-12069# ARO, Inc., Arnold Air Force Station, Tenn.
CORRELATION OF EXPERIMENTAL AND THEORETICAL STEADY-STATE SPINNING MOTION FOR A CURRENT FIGHTER AIRPLANE USING ROTATION-BALANCE AERODYNAMIC DATA Final Report, 1 Jul. 1976 - 30 Jun. 1977
T. F. Langham AEDC Jul. 1978 64 p refs
(AD-A058142; AEDC-TR-77-126) Avail: NTIS HC A04/MF A01 CSCL 01/2

An analytical study has been conducted to determine the usefulness of rotation-balance aerodynamic data in calculating the steady-state spin motion of a current fighter aircraft configuration. The analysis utilizes a nonlinear six-degree-of-freedom digital computer program to generate time histories of airplane spinning motion. Three aerodynamic data models were formulated and used in the spin analysis. The first model represents the conventional use of static and forced-oscillation data; the second model uses the static and forced-oscillation data but restricts the forced-oscillation data to that component of the total angular rate that is oscillatory; and the third model incorporates rotation-balance data from model 2 and restricts the rotation-balance data to that component of the total angular rate that is steady state. The results indicate a significantly different motion resulting from the three aerodynamic data models when compared to each other and to full-scale flight test steady-state spin motions. The motions produced by the rotation-balance aerodynamic model more closely simulate the motions exhibited during the flight tests. Author (GRA)

N79-12070# Bendix Corp., North Hollywood, Calif. Electrodynamics Div.
DEVELOPMENT OF A HIGH TEMPERATURE ROTARY ACTUATOR FOR AIRCRAFT HYDRAULIC SYSTEMS Final Report, Apr. 1972 - Dec. 1977
R. K. Vanausdal May 1978 204 p refs
(Contract F33615-72-C-1187; AF Proj. 3145)
(AD-A057931; AFAPL-TR-78-26) Avail: NTIS HC A10/MF A01 CSCL 13/7

This report describes the development program for a high temperature hydraulic rotary actuator based on the DYNAVECTOR concept. Included are illustrated results based on replies by six airframe companies to a Bendix survey that determined the projected 1975-80 horizontal tail and rudder actuator stiffness requirements for fighter/attack aircraft, as well as the critical design conditions relative to Mach number and altitude. Also reported are the results for the 800 F ambient testing of three different shaft seals designs (created for the program) that are presented in terms of leakage versus time, temperature and pressure. Actuator test results -- with and without the epicyclic gear transmission -- and analyses included in the report reveal that the limitation imposed by the particular transmission disengagement concept used for load decoupling (actuator redundancy application) prohibitively detracts from the performance of the actuator for analog control. Author (GRA)

N79-12071# Lockheed-Georgia Co., Marietta.
C-130 WELDBONDED FUSELAGE PANEL FLIGHT EVALUATION PROGRAM Final Report, 15 Oct. 1974 - 15 Dec. 1977
J. A. Kizer Dec. 1977 33 p refs
(Contract F33615-75-C-3010; AF Proj. 2401)
(AD-A057928; LG77ER0218; AFFDL-TR-77-138) Avail: NTIS HC A03/MF A01 CSCL 01/3

The objective of this program was to conduct an in-service evaluation of the C-130 weldbonded fuselage panel. A total of seven nondestructive inspections were conducted during which all of the inspections included visual and ultrasonic inspection of the weldbonded joints. Three of the seven inspections included radiographic inspections of a portion of the spot-welds in the weldbonded fuselage panel. All inspections were conducted coincident with aircraft isochronal inspections. The fuselage panel performed in an operational environment with a minimum of problems as the only defects detected were some small breaks in the interior paint finish over the skin-to-ring frame sealed fillets. These small breaks were detected with the aid of a pocket magnifier as they could not have been detected by the naked eye. These small paint finish breaks were repaired and recurrence or additional breaks were not detected in the two subsequent inspections. The Air Force will continue conducting periodic inspections on the weldbonded fuselage panel. GRA

N79-12072# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
A MINIMUM WEIGHT ANALYSIS OF AEROSPACE VEHICLE RECOVERY SYSTEMS Final Report, Nov. 1974 - Jun. 1975
Stephen R. Mehaffie May 1977 127 p refs
(AF Proj. 1964)
(AD-A058025; AFFDL-TR-77-26) Avail: NTIS
HC A07/MF A01 CSCL 01/3

This report presents an algorithm for determining the minimum weight of an aerospace vehicle recovery system. The weight of the recovery system composed of parachute and impact attenuation subsystems is examined for the effects of advanced technologies including Kevlar materials and advanced attenuators. The vehicle description for input to the algorithm consisting of recovered weight, maximum acceleration, and characteristic length allows the algorithm to be applied to a large variety of aerospace vehicles and payloads. The algorithm provides optimized component weights and operating characteristics. Author (GRA)

N79-12073# Bihrle Applied Research, Inc., Jericho, N. Y.
DESIGN CHARTS AND BOUNDARIES FOR IDENTIFYING DEPARTURE RESISTANT FIGHTER CONFIGURATIONS Final Report
William Bihrle, Jr. and Billy Barnhart Jul. 1978 76 p refs
(Contract N62269-77-C-0106; WF41421201)
(AD-A058043; NADC-76154-30) Avail: NTIS
HC A05/MF A01 CSCL 01/3

A study is reported which generated design charts and developed associated boundaries for identifying departure and uncoordinated roll-reversal flight characteristics as a function of three aerodynamic parameters. This information should be valuable for specification, design and evaluation purposes. The investigation utilized a large angle, six-degree-of-freedom digital computer program to simulate the motions of a fighter performing a severe air combat maneuver for different combinations of rolling and yawing coefficient and lateral control characteristics.
Author (GRA)

N79-12074# Army Research and Technology Labs., Fort Eustis, Va.
TESTS TO DETERMINE THE ULLAGE EXPLOSION TOLERANCE OF HELICOPTER FUEL TANKS
Charles M. Pedriani Jun. 1978 42 p refs
(DA Proj. 1F2-62209-AH7600)
(AD-A058188; USARTL-TN-29) Avail: NTIS
HC A03/MF A01 CSCL 13/4

Twenty-one ballistic tests were conducted on fuel tanks similar to those on US Army helicopters to determine their ability to withstand pressures generated during an ullage explosion. The tanks were filled with known JP-4/air gas mixtures and impacted with caliber .30 M1 incendiary projectiles at approximately 2000 feet per second. The pressure rise was measured with transducers and the tank reponse was recorded with high-speed photography. The results indicated that noncrashworthy bladder tanks in honeycomb structure have an overpressure threshold of about 20 psig, while crashworthy tanks in Z-bar reinforced aluminum structure can tolerate explosive pressure to about 60 psig. The results can be useful in the design of optimum ullage protection schemes for the armor piercing incendiary (API) combat threat. Author (GRA)

N79-12075# Boeing Aerospace Co., Seattle, Wash.
INTEGRATION OF AIR CUSHION LANDING SYSTEM TECHNOLOGY INTO THE JINDIVIK REMOTELY PILOTED VEHICLE Final Report, Apr. 1975 - Jan. 1977
A. J. P. Lloyd and V. K. Rajpaul Mar. 1978 308 p refs
(Contract F33615-75-C-3088; AF Proj. 2402)
(AD-A058004; AFFDL-TR-77-21) Avail: NTIS
HC A14/MF A01 CSCL 01/3

Studies have been conducted on an Air Cushion Landing System for the Australian Jindivik target drone aircraft. Analyses are presented of the airflow and yaw thruster control systems, and the vehicle stability with a deployed recovery trunk is assessed. The vehicle touchdown and slideout on a recovery trunk are presented, and the design of an improved retention/release system is shown. Author (GRA)

N79-12076# Naval Air Test Center, Patuxent River, Md.
TESTING THE F-18 AT THE US NAVAL AIR TEST CENTER
Joe L. Dunn 14 Aug. 1978 16 p
(AD-A058036; NATC-TM-78-5-SA) Avail: NTIS
HC A02/MF A01 CSCL 01/3

The U.S. Navy is procuring the F-18 as a replacement for the F-4 and A-7 aircraft starting in 1983. The F-18 design advancements include control-by-wire digital flight control system, cockpit designed for one man operability, state-of-the-art avionics integration by software/multiplex techniques, and a high use of composite materials. The unique aspect of the F-18 Full Scale Development program is that it will be principal sited at the Naval Air Test Center, Patuxent River, Maryland. Author (GRA)

N79-12077# Mission Research Corp., Albuquerque, N. Mex.
AIRCRAFT CABLE PARAMETER STUDY Final Report
H. M. Fowles, L. D. Scott, A. K. Agrawal, and K. M. Lee Oct. 1977 175 p
(Contract F29601-76-C-0091)
(AD-A058267; AD-E200096; AMRC-R-92) Avail: NTIS
HC A08/MF A01 CSCL 17/2

This report describes experimental and analytical results obtained from a study of the transmission line properties of multiconductor cables commonly found on aircraft. A method for the complete characterization of multiconductor transmission lines in inhomogeneous media is presented and verified experimentally. Bulk transmission line properties of bundles containing up to 20 closely spaced wires were measured for cases of a bundle near a flat ground plane, near a corner, and in conduit. The results are compared with single wire handbook formulas and discussed. Perturbations on transmission lines caused by bulkheads, cable clamps, and the ribbed interior of aircraft were measured for several cases. It was found that the perturbations could be treated as lumped capacitive loads on an otherwise uniform line. Cable parameter measurements conducted on board an EC-135 aircraft are presented and discussed. GRA

N79-12078# Army Aviation Engineering Flight Activity, Edwards AFB, Calif.
AH-1G HELICOPTER MAIN ROTOR FLOW SURVEY Final Report, May 1975 - Oct. 1975
Barclay H. Boirun, Edward E. Bailes, Robert P. Jefferis, James A. Arnold, and Joseph C. Meiss Apr. 1978 92 p refs
(AD-A057443; USAAEFA-74-02) Avail: NTIS
HC A05/MF A01 CSCL 20/4

The Army requirement to fire unguided missiles from attack helicopters in hover and low-speed flight conditions has generated a need to accurately predict the rotor flow environment through which the missile must travel. Representative flight test airflow data is presented with which to determine the launch behavior of missiles and assess the accuracy of theoretical flow field prediction models. A UH-1M helicopter was previously used to develop instrumentation and test methodology for conducting the airflow survey which were applied to the AH-1G test program. The general test objective was to define the rotor wake boundary and three-dimensional airflow velocity components as a function of forward speed. GRA

N79-12079# AiResearch Mfg. Co., Torrance, Calif.
LIFT PERFORMANCE INDICATOR SYSTEM FEASIBILITY STUDY Final Report
W. J. Harris Jul. 1978 212 p
(Contract DAAJ02-76-C-0036)
(AD-A059238; AiResearch-78-14821; USARTL-TR-78-5) Avail: NTIS HC A10/MF A01 CSCL 01/2

This report presents the results of a study that was conducted to determine the feasibility of a helicopter lift performance indicator (LPI) system that would inform the pilot of the likelihood of a successful takeoff and landing before committing the aircraft to flight. The study includes the determination of the functional requirements (including accuracy) for an LPI system. Four specific helicopters were considered: CH-47C, CH-54B, UH-1H, and UH-60A (UTTAS). The LPI system should be capable of informing the pilot of the vehicle's hovering capabilities (both in and out of ground effect), vertical and best-airspeed climb capabilities, and several other performance measures (essentially the same type of information as contained in the performance

section of the operator's manual for the vehicle). This information should be selectable for real-time and remote-site conditions (input by the pilot), for both single and dual engine operation, and for maximum and normal rated power conditions. Wind velocity effects should be included. Generating this information in advance of lift-off requires that actual vehicle weight be measured. The system should also compute center of gravity from measured weight because of its impact on performance capability and its importance with respect to cargo positioning.
GRA

N79-12080# Advisory Group for Aerospace Research and Development, Paris (France).
TECHNICAL EVALUATION REPORT ON THE SPECIALISTS' MEETING OF THE FLIGHT MECHANICS PANEL ON PILOTED AIRCRAFT ENVIRONMENT SIMULATION TECHNIQUES
K. J. Staples (RAE, Bedford, England) Oct. 1978 18 p Meeting held at Brussels, 24-27 Apr. 1978
(AGARD-AR-126; ISBN-92-835-1299-5) Avail: NTIS HC A02/MF A01

The proceedings of a meeting concerning the flight mechanics of and simulation techniques of piloted aircraft environments are presented. Some of the following topics are discussed: (1) requirements on simulation of the environment; (2) simulation of the atmospheric environment; and (3) out of the cockpit visual scenes.
B.B.

N79-11999 European Space Agency, Paris (France).
DYNAMIC STABILITY OF A TWO-BLADE ROTOR
Cam Thuy Tran (ONERA) *In its* La Rech. Aerospatiale, Bi-monthly Bull. No. 1978-1 (ESA-TT-491) Aug. 1978 p 63-96 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1978-1, Jan.-Feb. 1978 p 25-40 Original report in FRENCH previously announced as A78-32037 Supported in part by the Aeronautical Test Centre, Toulouse (For primary document see N79-11996 03-01)
HC A06/MF A01

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

N79-12081*# Milco International, Inc., Huntington Beach, Calif.
BASIC AVIONICS MODULE DESIGN FOR GENERAL AVIATION AIRCRAFT Final Report
Richard K. Smyth and David E. Smyth Aug. 1978 155 p
(Contract NAS1-15284)
(NASA-CR-158953) Avail: NTIS HC A08/MF A01 CSCL 01D

The design of an advanced digital avionics system (basic avionics module) for general aviation aircraft operated with a single pilot under IFR conditions is described. The microprocessor based system provided all avionic functions, including flight management, navigation, and lateral flight control. The mode selection was interactive with the pilot. The system used a navigation map data base to provide operation in the current and planned air traffic control environment. The system design included software design listings for some of the required modules. The distributed microcomputer uses the IEEE 488 bus for interconnecting the microcomputer and sensors.
J.A.M.

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N79-12082 Ohio State Univ., Columbus.
INTERACTION OF POLICY AND STOCHASTIC EFFECTS IN AN AIR FORCE REPARABLE ITEM PROCESS: A MODEL OF AIRCRAFT ENGINE AGING AND REMOVAL OVER TIME Ph.D. Thesis
Eugene Etheridge Jones 1978 196 p
Avail: Univ. Microfilms Order No. 7819615

An integrated model was developed for jet aircraft engine aging and removal over calendar time which is applicable to Air Force engine management in areas such as engine maintenance scheduling and life cycle costing. This macrolevel model treats the jet engine as a generic reparable item and its removal, whether specified by actual failure or policy, signifies a failure event for which the logistics system generates a demand. This unique model was based on the premise that the multi dimensional data generated by the jet engine (or other reparable item) in a strongly controlled logistics environment contain stochastic, deterministic (policy-related) and other strongly biased components which need not be independent or distinguishable or yield to analysis with typical statistical methods.
Dissert. Abstr.

N79-12083*# National Aeronautics and Space Administration, Lewis Research Center, Cleveland, Ohio.
PRELIMINARY STUDY OF OPTIMUM DUCTBURNING TURBOFAN ENGINE CYCLE DESIGN PARAMETERS FOR SUPERSONIC CRUISING
Laurence H. Fishbach Nov. 1978 26 p refs
(NASA-TM-79047; E-9856) Avail: NTIS HC A03/MF A01 CSCL 21E

The effect of turbofan engine overall pressure ratio, fan pressure ratio, and ductburner temperature rise on the engine weight and cruise fuel consumption for a mach 2.4 supersonic transport was investigated. Design point engines, optimized purely for the supersonic cruising portion of the flight where the bulk of the fuel is consumed, are considered. Based on constant thrust requirements at cruise, fuel consumption considerations would favor medium by pass ratio engines (1.5 to 1.8) of overall pressure ratio of about 16. Engine weight considerations favor low bypass ratio (0.6 or less) and low wverall pressure ratio (8). Combination of both effects results in bypass ratios of 0.6 to 0.8 and overall pressure ratio of 12 being the overall optimum.
A.R.H.

N79-12084*# Pratt and Whitney Aircraft Group, East Hartford, Conn. Commercial Products Div.
ENERGY EFFICIENT ENGINE PRELIMINARY DESIGN AND INTEGRATION STUDY
D. E. Gray et al Nov. 1978 362 p
(Contract NAS3-20628)
(NASA-CR-135396; PWA-5500-18) Avail: NTIS HC A16/MF A01 CSCL 21E

The technology and configurational requirements of an all new 1990's energy efficient turbofan engine having a twin spool arrangement with a directly coupled fan and low-pressure turbine, a mixed exhaust nacelle, and a high 38.6:1 overall pressure ratio were studied. Major advanced technology design features required to provide the overall benefits were a high pressure ratio compression system, a thermally actuated advanced clearance control system, lightweight shroudless fan blades, a low maintenance cost one-stage high pressure turbine, a short efficient mixer and structurally integrated engine and nacelle. A conceptual design analysis was followed by integration and performance analyses of geared and direct-drive fan engines with separate or mixed exhaust nacelles to refine previously designed engine cycles. Preliminary design and more detailed engine-aircraft integration analysis were then conducted on the more promising configurations. Engine and aircraft sizing, fuel

burned, and airframe noise studies on projected 1990's domestic and international aircraft produced sufficient definition of configurational and advanced technology requirements to allow immediate initiation of component technology development.
A.R.H.

N79-12085*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF FLIGHT LOADS ON TURBOFAN ENGINE PERFORMANCE DETERIORATION
E. G. Stakolich, A. Jay (Pratt and Whitney Aircraft, East Hartford, Conn.), E. S. Todd (Pratt and Whitney Aircraft, East Hartford, Conn.), P. G. Kafka (Boeing Com. Airplane Co., Renton, Wash.), and J. L. White (Boeing Com. Airplane Co., Renton, Wash.) 1978 22 p refs Proposed for presentation at the 24th Ann. Intern. Gas Turbine Conf., San Diego, Calif., 11-15 Mar. 1979; sponsored by the Am. Soc. of Mech. Engr.
(NASA-TM-79041; E-9844) Avail: NTIS HC A02/MF A01 CSCL 21E

A significant percentage of high bypass ratio, turbofan engine performance deterioration was caused by an increase in operating clearance between fan/compressor and turbine blades and their outer air seals. These increased clearances resulted from rubs induced by a combination of engine power transients and aircraft flight loads. An analytical technique for predicting the effect of quasi-steady state aircraft flight loads on engine performance deterioration was developed and is presented. Thrust, aerodynamic and inertia loads were considered. Analytical results are shown and compared to actual engine test experience. J.A.M.

N79-12086*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NASA RESEARCH ON GENERAL AVIATION POWER PLANTS
Warner L. Stewart, Richard J. Weber, Edward A. Willis, and Gilbert K. Sievers 1978 14 p refs Proposed for presentation at the 15th Ann. Meeting and Tech. Display, Washington, D. C., 6-8 Feb. 1979; sponsored by AIAA
(NASA-TM-79031; E-9828) Avail: NTIS HC A02/MF A01 CSCL 21A

Propulsion systems are key factors in the design and performance of general aviation airplanes. NASA research programs that are intended to support improvements in these engines are described. Reciprocating engines are by far the most numerous powerplants in the aviation fleet; near-term efforts are being made to lower their fuel consumption and emissions. Longer-term work includes advanced alternatives, such as rotary and lightweight diesel engines. Work is underway on improved turbofans and turboprops. Author

N79-12087*# Battelle Columbus Labs., Ohio.
COMPUTER-AIDED ANALYSIS AND DESIGN OF THE SHAPE ROLLING PROCESS FOR PRODUCING TURBINE ENGINE AIRFOILS Final Report, 1 Oct. 1976 - 30 Jun. 1978
G. D. Lahoti, N. Akgerman, and T. Altan Dec. 1978 251 p refs
(Contract NAS3-20380)
(NASA-CR-159445) Avail: NTIS HC A12/MF A01 CSCL 21E

Mild steel (AISI 1018) was selected as model cold rolling material and Ti-6A1-4V and Inconel 718 were selected as typical hot rolling and cold rolling alloys, respectively. The flow stress and workability of these alloys were characterized and friction factor at the roll/workpiece interface was determined at their respective working conditions by conducting ring tests. Computer-aided mathematical models for predicting metal flow and stresses, and for simulating the shape rolling process were developed. These models utilized the upper bound and the slab methods of analysis, and were capable of predicting the lateral spread, roll separating force, roll torque, and local stresses, strains and strain rates. This computer-aided design system was also capable of simulating the actual rolling process, and thereby designing the roll pass schedule in rolling of an airfoil or a similar shape. J.A.M.

N79-12088*# General Electric Co., Cincinnati, Ohio.
EXPERIMENTAL CLEAN COMBUSTOR PROGRAM: PHASE 3: TURBULENCE MEASUREMENT ADDENDUM Final Report
J. R. Taylor Nov. 1978 40 p refs
(Contract NAS3-19736)
(NASA-CR-135422; R78AEG529) Avail: NTIS HC A03/MF A01 CSCL 21E

Airflow turbulence parameters were measured in the high pressure, high temperature flow stream leaving the compressor of an operating gas turbine engine. A water cooled hot film turbulence probe was used to determine the turbulence intensity and length scale in the compressor exit flow stream of the CF6-50 engine. Data were obtained only at idle operating conditions. At engine power levels above idle conditions, durability problems and erratic data readings were encountered with the turbulence measurement probes. Turbulence measurements were made at three radial immersions at a point 15.5 cm downstream of the compressor outlet guide vanes in the compressor exit diffuser. The passage height at this point is 5.54 cm. Data reduction was accomplished with a time-data fast Fourier transform (FFT) system. This system finds the power spectral density distribution (PSD) of a large number of data samples using a direct Fourier transform algorithm and finds the autocorrelation parameter for these data by doing an FFT analysis of the PSD curves for a series of time delay intervals. Author

N79-12089# Mitre Corp., McLean, Va. Metrek Div.
ATC ACCOMMODATION OF FUEL CONSERVATIVE TURBOJET OPERATIONS Final Report
S. C. Mohleji, R. A. Rucker, B. M. Horowitz, and N. O. Eaddy May 1978 153 p refs
(Contract DOT-FA78WA-4075)
(AD-A059050; MTR-78-49; FAA-EM-78-14) Avail: NTIS HC A08/MF A01 CSCL 21/5

Fuel savings potential of each of five fuel conservation ideas which, if adopted, would require significant changes to the Federal Air Regulations in the way the air traffic control system operates were estimated and compared. The five ideas were (1) absorb landing delays before leaving en route airspace, (2) permit cleaner, higher speed approach and landing procedures, (3) lower the altitude restriction on the 250 knot speed limit in TCAs, (4) increase the number of flight levels above 29,000 feet, and (5) eliminate fixed cruise or crossing altitude restrictions. Comparative estimates of the fuel saving potential of each of these ideas were developed, both on a perflight basis and on an annual national basis. For three of the more promising ideas, the potential implementation problems and possible solutions were identified and explored. B.B.

N79-12090# Boeing Military Airplane Development, Seattle, Wash.
AIRPLANE RESPONSIVE ENGINE SELECTION (ARES). VOLUME 1: ARES USER GUIDE Final Report, 15 Oct. 1973 - 15 Jul. 1977
Glenn J. Eckard and Michael J. Healy Apr. 1978 240 p refs
(Contract F33615-73-C-2084; AF Proj. 3066)
(AD-A057392; AFAPL-TR-78-13-Vol-1) Avail: NTIS HC A11/MF A01 CSCL 21/5

The objectives of the Airplane Responsive Engine Selection (ARES) program were to develop and apply improved analytical techniques for airplane and engine design selection and integration. These objectives were attained in large part by the development of the ARES data management system, the use of which is described in this document. The ARES system allows the efficient management of multi-dimensional parametric analyses with sufficient accuracy for conceptual and preliminary design activities. When used properly, along the guidelines described, it will prove to be a powerful analytical tool. GRA

N79-12091# Dayton Univ. Research Inst., Ohio.
IMPACT OF SOFT BODIES ON JET ENGINE FAN BLADES Interim Report, 1 Jan. - 1 Jun. 1976
John P. Barber, Philip F. Fry, John M. Klyce, and Henry R. Taylor Apr. 1977 28 p ref
(Contract F33615-75-C-5052)
(AD-A058194; UDRI-TR-76-33; AFML-TR-77-29) Avail: NTIS HC A02/MF A01 CSCL 21/5

The momentum transferred to J-79 jet engine fan blades through impact with soft body projectiles was measured. Impacts

onto stainless steel disks mounted normal to and 25 deg to trajectory were also investigated. Elementary analytical models of the momentum transfer were constructed for each of the three configurations. Author (GRA)

N79-12092# United Technologies Corp., Stratford, Conn. Sikorsky Aircraft Div.
REVIEW OF ENGINE/AIRFRAME/DRIVE TRAIN DYNAMIC INTERFACE DEVELOPMENT PROBLEMS Final Report, Aug. 1977 - Mar. 1978
W. J. Twomey and E. H. Ham Jun. 1978 128 p
(Contract DAAJ02-77-C-0037; DA Proj. 1L1-62209-AH-76)
(AD-A057932; SER-510003; USARTL-TR-78-13) Avail: NTIS HC A07/MF A01 CSCL 21/5

The coupled interaction between two or more helicopter subsystems has often been the source of vibration problems - problems often costly and time-consuming to correct because they have not surfaced until the design and development of the individual subsystems are far advanced. This report gives a review of Sikorsky experience with such problems over the past twenty years of developing gas turbine powered helicopters. It represents part of an overall Government effort to accumulate data which will eventually lead to solutions of generic problems of this type. The problems presented include forced vibration problems (wherein the excitations come from either aerodynamic loads on the main rotor, or mechanical imbalances in the engine/drive train), self-excited vibrations, and a transient response problem. GRA

N79-12093# Hamilton Standard, Windsor Locks, Conn.
TEST METHODOLOGY CORRELATION FOR FOREIGN OBJECT DAMAGE Technical Report, Mar. 1976 - Dec. 1977
T. Wong and Robert W. Cornell Wright-Patterson AFB, Ohio AFAL Mar. 1978 120 p refs
(Contract F33615-76-C-5211)
(AD-A057322; AFML-TR-78-16) Avail: NTIS HC A06/MF A01 CSCL 21/5

The adaptation of advanced composite materials in fan blades requires the evaluation of their resistance to damage from foreign object impacts. An alternative approach to testing full-scale blades is to use laboratory material coupon impact tests and complimentary analysis methods to simulate and predict performance of composite materials in full-scale blades. This study provided an assessment and development of laboratory coupon tests for evaluating potential fan blade materials. Both simple and sophisticated elastic beam blade impact analyses and programs were used. In the first phase, 24 impacted cantilevered and simply-supported specimens of different materials were analyzed, and the predicted maximum stressing and time history stressing and damage results were found to compare favorably with the test results. Because the local and gross spanwise critical stressing occurs at separate places in the cantilever specimen, but at the same location in the the simply-supported specimen, and because the support action of the latter is nonlinear, the cantilever specimen was found to be the better specimen to study the gross resistance of materials to impact. The second phase consisted of evaluating six rotating blade impact cases and comparing the theoretical and test results. The correlation was good for large missile impacts but only fair for small missile impacts. GRA

N79-12094# Kaman Aerospace Corp., Bloomfield, Conn.
ENGINE/AIRFRAME/DRIVE TRAIN DYNAMIC INTERFACE DOCUMENTATION Final Report
M. A. Bowes Jun. 1978 24 p
(Contract DAAJ02-77-C-0039; DA Proj. 1L2-62209-AH-76)
(AD-A058197; R-1536; USARTL-TR-78-14) Avail: NTIS HC A02/MF A01 CSCL 01/3

An historical review of Kaman Aerospace Corporation helicopter development effort was conducted. Information pertaining to instances of engine/airframe/drive train incompatibility was extracted from the resulting review data. The details of each incompatibility problem and its solution are presented and discussed. These problems were found to be associated with normally occurring rotor and drive system vibratory excitations and resonance amplified rotor and drive system vibratory excitations. It is concluded that the type of incompatibility problems encountered in helicopter development programs can be expected in the future. For the most part, these problems, and their solutions, are an intrinsic part of the development process, and they will not be eliminated through the application of increasingly more sophisticated and complex analytical design tools. It is recommended that research in this area by directed towards improved dynamic testing methods which will enable more rapid, efficient determination of the exact nature of future incompatibility problems, once they are encountered.
Author (GRA)

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N79-12095 Stanford Univ., Calif.
A DESIGN METHOD WITH APPLICATION TO PREFILTERS AND SAMPLING-RATE SELECTION IN DIGITAL FLIGHT CONTROL SYSTEMS Ph.D. Thesis
Uri Peled 1978 222 p
Avail: Univ. Microfilms Order No. 7822557

The effect of prefilters on sampling rate selection is analyzed by comparing the noise response of several systems designed over a wide range of prefilter breakpoint frequencies and sampling rates, but all with the same response to output commands. A model-following design method was developed to match the step response of the system output to the step response of a model in the presence of deterministic disturbances and/or random process and measurement noise. This method was applied successfully to an integrator as a plant, the short period motion of the F-8 aircraft, and wing flutter control. Simple compensations achieve good performance. Low noise response and good output command response are obtained at prefilter breakpoint frequencies as low as the bandwidth, thereby reducing the sampling rate to as low as twice the bandwidth. Other factors determining low sampling rate are reviewed and related to a proposed low sampling rate selection procedure. Dissert. Abstr.

N79-12096*# National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
EFFECT OF SAMPLING RATE AND RECORD LENGTH ON THE DETERMINATION OF STABILITY AND CONTROL DERIVATIVES
Martin J. Brenner, Kenneth W. Iliff, and Robert K. Whitman Dec. 1978 140 p refs
(NASA-TM-72858; H-1077) Avail: NTIS HC A07/MF A01 CSCL 01C

Flight data from five aircraft were used to assess the effects of sampling rate and record length reductions on estimates of stability and control derivatives produced by a maximum likelihood estimation method. Derivatives could be extracted from flight data with the maximum likelihood estimation method even if there were considerable reductions in sampling rate and/or record length. Small amplitude pulse maneuvers showed greater degradation of the derivative maneuvers than large amplitude pulse maneuvers when these reductions were made. Reducing the sampling rate was found to be more desirable than reducing the record length as a method of lessening the total computation time required without greatly degrading the quantity of the estimates. Author

N79-12097# Illinois Univ. at Urbana-Champaign, Urbana. Decision and Control Lab.
FEEDBACK CONTROLLED AIRCRAFT SENSITIVITY TO PARAMETER VARIATIONS M.S. Thesis
Robert Lea Jackson Aug. 1977 75 p refs
(Contract DAAB07-72-C-0259; Grant AF-AFOSR-2570-73)
(AD-A057643; DC-13; UILU-ENG-77-2252; R-806) Avail: NTIS HC A04/MF A01 CSCL 01/3

This report is concerned with a sensitivity study of a flight control design using optimal control theory and observer theory. A simplified model of an airplane's vertical motion is used. Hybrid computer simulation indicates that the linearized design is satisfactory only if the operating conditions are not too drastically

different from the nominal, and that a multipoint design, or an adaptive control design might be preferable. Author (GRA)

N79-12098# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN ANALYSIS OF THE STABILITY OF AN AIRCRAFT EQUIPPED WITH AN AIR CUSHION RECOVERY SYSTEM M.S. Thesis
Max Allen Stafford Mar. 1978 222 p refs
(AD-A057434; AFIT/GGC/EE-78M-5) Avail: NTIS HC A10/MF A01 CSCL 01/3

The stability of an aircraft equipped with an air cushion recovery system (ACRS) was investigated both in-flight and during the landing (slideout) phase of flight. Digital computer simulations were used to identify unstable tendencies of a specific aircraft (the Jindivik drone). Control system designs are proposed to eliminate the instabilities. A nonlinear, six degree of freedom, aerodynamic model is developed based on available wind-tunnel data. The model is used in a computer software package, EASY, to simulate the vehicle in flight. A model of the air cushion recovery system is also developed. The model is generated by matching experimental data obtained from an actual ACRS with 14 spring/damper units. The model is verified by computer simulation, and the slideout simulations are performed. These simulations reveal a lateral-directional instability in the slideout. An optimal control design is proposed and verified, after which it is shown that the stability of the system is dramatically enhanced by the addition of an optimal controller. GRA

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

N79-12099# Dunlay (William J., Jr.), Bala Cynwyd, Pa.
AIRPORT IMPROVEMENT TASK FORCE DELAY STUDY: DATA COLLECTION, REDUCTION AND ANALYSIS Final Report, 18 Aug. - 22 Nov. 1977
William J. Dunlay, Jr. Nov. 1977 53 p refs Sponsored by FAA
(AD-A056201; FAA-EM-78-7) Avail: NTIS HC A04/MF A01 CSCL 01/5

A plan is presented for the collection, reduction, and analysis of data in support of the validation of an airside delay simulation model. Data collection forms are presented along with the forms on which data are reduced and finally merged from several sources into a single summary format by aircraft. Detailed suggestions are given for the statistical analysis of model estimates and for a time series analysis of these estimates vis-a-vis corresponding observed data. Included are guidelines for interpreting the results of the statistical tests. Author

N79-12100# Army Engineer Waterways Experiment Station, Vicksburg, Miss.
LITERATURE REVIEW-ELASTIC CONSTANTS FOR AIRPORT PAVEMENT MATERIALS Final Report
James L. Green Mar. 1978 140 p refs
(Contract DOT-FA73WAI-377)
(AD-A056195; FAA-RD-76-138) Avail: NTIS HC A07/MF A01 CSCL 01/5

A literature review was made to support an ongoing study to develop a method for evaluating airport pavements based on the layered elastic theory and using constants as determined from vibratory test results. The review covered the definitions and relations between elastic constants, methods used by various researchers for measuring elastic constants, and values of elastic constants found (or used) by various researchers. The review also included a study to determine the sensitivity of pavement responses to arbitrarily assigned values of elastic constants and an examination of the relationships between vibrator test results and elastic constants. The latter subject included a special preliminary examination of the relationship between the results from tests with the WES 16 kip vibrator and elastic constants. A summary discussion was given of the findings from the literature review and the special preliminary examination. Finally, recommendations were made to facilitate further planning and implementation of the ongoing study mentioned. Author

N79-12101# Naval Postgraduate School, Monterey, Calif.
AN EXPERIMENTAL INVESTIGATION OF TURBOJET TEST CELL AUGMENTORS M.S. Thesis
Charles Nim Sapp, Jr. Jun. 1978 72 p refs
(AD-A057903) Avail: NTIS HC A04/MF A01 CSCL 14/2

A one-eighth scale turbojet test cell was used to investigate the effects of various design parameters on augmentor performance. The augmentor inlet design, nozzle-to-augmentor spacing, engine flow rate, nozzle total temperature and pressure, and augmentor tube diameter were varied to determine what effect they had on augmentation ratio, total air pumped through the system, and pressure, temperature, and velocity distributions within the augmentor tube. In addition, two augmentor tubes were combined in tandem to investigate the characteristics of a tertiary augmentor configuration. Author (GRA)

N79-12102# Air Force Human Resources Lab., Brooks AFB, Tex.
EVALUATION OF A LOW FIDELITY SIMULATOR (LFS) FOR INSTRUMENT TRAINING Interim Report, Apr. 1976 - Oct. 1977
John V. Crosby, Lawrence D. Pohlmann, Barry Leshowitz, and Wayne L. Waag Jul. 1978 14 p refs
(AF Proj. 2313)
(AD-A058139) Avail: NTIS HC A02/MF A01 CSCL 01/4

The objective of this study was to investigate the transfer of training from a low fidelity simulator (LFS) to a higher fidelity device, and subsequently to the aircraft. An attempt was made to determine both the magnitude of transfer, as well as the temporal duration of the effect. A transfer of training design was employed using 14 students entering Undergraduate Pilot Training (UPT). Subjectives were divided into two equal groups (n = 7). One group received pretraining on the LFS, while the other did not. LFS training consisted of 10 hours of basic instrument instruction conducted over a 2 week period prior to UPT entry. During LFS training, students were advanced on a proficiency basis, using objectively derived scoring procedures. Author (GRA)

N79-12103# Army Research Office, Washington, D. C.
CALIBRATION OF THE AEDC-PWT 16-FOOT TUNNEL WITH THE PROPULSION TEST SECTION AT VARIOUS REYNOLDS NUMBERS Final Report, Oct. 1974 - Jun. 1975
F. M. Jackson Aug. 1978 103 p refs
(AD-A057877; AEDC-TR-77-121) Avail: NTIS HC A06/MF A01 CSCL 14/2

Tests were conducted in the AEDC Propulsion Wind Tunnel (16T) to determine the tunnel test section Mach number distributions and calibration at various Reynolds numbers. The calibration was conducted at Mach numbers from 0.2 to 1.6 and at Reynolds numbers from 400,000/ft to 6,400,000/ft. The calibration was conducted using the propulsion test section (Test Section 1) and centerline pipe and wall pressure orifices to define the Mach number distributions. A quantitative evaluation of the effects of tunnel pressure ratio, test section wall angle, and Reynolds number on the centerline Mach number distributions was determined by analysis of the local Mach number deviations. The results indicate that Mach number distributions of good quality are obtained for both zero and the optimum wall angle schedule. For complete generality, the Tunnel 16T calibration must be defined as a function of test section wall angle, Reynolds number, and Mach number. GRA

N79-12104# Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
AERONAUTICAL SYSTEMS TECHNOLOGY NEEDS: TEST FACILITIES AND TEST EQUIPMENT Annual Report, calendar year 1978
Donald C. Kittinger Apr. 1978 47 p refs Supersedes ASD-TR-77-3

(AD-A058209; ASD-TR-78-22; ASDOTR-77-3) Avail: NTIS HC A03/MF A01 CSCL 05/1

This report is a part of a compilation of formalized Technology Needs (TN) covering Equipment Subsystems as identified by the Aeronautical Systems Division. They are based on development/operational experience, system studies and new concepts - all related to future system applications. Their presentation is to serve a threefold purpose; i.e., (1) guidance for technology program, (2) proven development potential, and (3) engineering data/requirements essential for technology use in systems. GRA

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N79-12105*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE DEEP SPACE NETWORK Progress Report, Jul. 1978 - Aug. 1978
15 Oct. 1978 102 p refs
(NASA-CR-157949; JPL-PR-42-47) Avail: NTIS HC A06/MF A01 CSCL 22A

Progress in flight project support, tracking and data acquisition research and technology, network engineering, hardware and software implementation, and operations is reported. For individual titles, see N79-12106 through N79-12120.

N79-12108*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Office of Tracking and Data Acquisition.
NETWORK FUNCTIONS AND FACILITIES c14
N. A. Renzetti *In its* The Deep Space Network 15 Oct. 1978 p 1-3 (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 14B

The network is designed for two-way communications with unmanned spacecraft traveling approximately 16,000 km (10,000 miles) from earth to the farthest planets and to the edge of our solar system. The objectives, functions, and organization of the Deep Space Network are summarized. Deep space station, ground communication, and network operations control capabilities are described. S.B.S.

N79-12107*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. TDA Engineering Office.
DSN RADIO SCIENCE SYSTEM, MARK III-78 c32
A. L. Berman *In its* The Deep Space Network 15 Oct. 1978 p 4-13 refs (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 17B

Mark III-78, is one of eight DSN Data Systems which provide major data types and functional capabilities to flight projects. It includes the equipment, software, personnel, documentation, procedures, and resources necessary to deliver the required data to flight projects. A system definition is given along with key characteristics, functional description, system configuration, testing, implementation status, and system schedule. S.B.S.

N79-12106*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Deep Space Network Operations Office.
VIKING EXTENDED MISSION SUPPORT c14
R. L. Gillette *In its* The Deep Space Network 15 Oct. 1978 p 15-20 (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 22A

Deep Space Network tracking activities for the Viking mission are reported. Several orbiter and lander problems and their solutions are discussed. Tracking support data include the number of commands transmitted by month, tracking time in hours, and telemetry intermediate data record performance. A Viking mission profile is also given. S.B.S.

N79-12109*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. TDA Mission Support Office.
PIONEER 10 AND 11 MISSION SUPPORT c14
R. B. Miller *In its* The Deep Space Network 15 Oct. 1978 p 21-25 refs (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 14B

Estimates of the Deep Space Network performance capability in tracking Pioneer 10 to the telecommunications limit and for Pioneer 11 Saturn encounter are discussed. Graphs of downlink performance estimates giving geocentric range, antenna elevation, and time are included. S.B.S.

N79-12110*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
HELIOS MISSION SUPPORT c14
P. S. Goodwin, W. N. Jensen, and G. M. Rockwell *In its* The Deep Space Network 15 Oct. 1978 p 26-28 (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 14B

Deep Space Network support of Helios mission operations is discussed. Included is information on the Helios 1, 7th aphelion, Helios 2, 5th aphelion, science experiments, 22-bit error polynomial code (EPC) testing, and other mission-related activities. Mission operations and status are summarized and specific correction commands are described. Special activities and experiments include Faraday rotation data collection and a solar wind tracks experiment. S.B.S.

N79-12111*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystems Section.
HYDROGEN MASER FREQUENCY STANDARD COMPUTER MODEL FOR AUTOMATIC CAVITY TUNING SERVO SIMULATIONS c36
P. D. Potter and C. Finnie *In its* The Deep Space Network 15 Oct. 1978 p 29-38 (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 20E

A computer model of the JPL hydrogen maser frequency standard was developed. This model allows frequency stability data to be generated, as a function of various maser parameters, many orders of magnitude faster than these data can be obtained by experimental test. In particular, the maser performance as a function of the various automatic tuning servo parameters may be readily determined. Areas of discussion include noise sources, first-order autotuner loop, second-order autotuner loop, and a comparison of the loops. S.B.S.

N79-12112*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystems Section.
A PROTOTYPE DSN X-S BAND FEED: DSS 13 APPLICATION STATUS, SECOND REPORT c33
W. F. Williams *In its* The Deep Space Network 15 Oct. 1978 p 39-50 refs (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 09C

A combiner was designed and fabricated for injecting X- and S-band into a horn for use at various DSN sites. Results indicate that the S-band combiner is much too narrow for use in both receiving and transmitting and that the horn patterns, when scattered, yield an improved efficiency over the present horn-hyperbola system. Predicted performance at DSS 13 by the calculated scattering of the model radiation patterns from the DSS 13 hyperbola is also discussed. S.B.S.

N79-12113*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Communications Systems Research Section.
AN ITERATIVE ALGORITHM FOR DECODING BLOCK CODES TRANSMITTED OVER A MEMORYLESS CHANNEL c61
H. Greenberger *In its* The Deep Space Network 15 Oct. 1978 p 51-59 refs (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 09B

An algorithm was developed which optimally decodes a block code for minimum probability of symbol error in an iterative manner. The initial estimate is made by looking at each bit independently and is improved by considering bits related to it through the parity check equations. The dependent bits are considered in order of interesting probability of error. Since the computation proceeds in a systematic way with the bits having the greatest effect being used first, the algorithm approaches the optimum estimate after only a fraction of the parity check equations were used. Author

N79-12114*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Communications Systems Research Section.
SOFT DECISION DECODING OF BLOCK CODES c17
L. D. Baumert and R. J. McEliece *In its* The Deep Space Network 15 Oct. 1978 p 60-64 refs (For primary document

see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 17B

The performance of certain block codes on a Gaussian channel is evaluated. The BCH codes are markedly superior to convolutional codes currently used for deep space missions. The algorithm is used to derive results, which provides a basis for a simple, almost optimum procedure for decoding these codes. S.E.S.

N79-12115*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. TDA Engineering Office.
RADIO SCIENCE REQUIREMENTS AND THE END-TO-END RANGING SYSTEM c32
A. L. Berman *In its* The Deep Space Network 15 Oct. 1978 p 65-71 refs (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 17B

Radio science ranging requirements negotiated between past and present flight projects and the DSN have generally focused on just the DSS and spacecraft hardware. All elements in the end-to-end system are analyzed and considered in terms of the error hierarchy. The end-to-end system is defined and examined as it applies to the generation of radio science ranging requirements. The variability of the performance levels of the system elements is emphasized with respect to the radio science experiment being performed and the DSN-spacecraft frequency band configuration. S.E.S.

N79-12116*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. TDA Engineering Office.
PARAMETRIC MODELING OF LOW-FREQUENCY WATER-VAPOR-INDUCED TROPOSPHERIC PATH LENGTH FLUCTUATIONS c32
A. L. Berman *In its* The Deep Space Network 15 Oct. 1978 p 72-76 refs (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 20N

Detailed wet tropospheric fluctuation information is presented in support of proposals to search for gravitational waves in ultra-precise Doppler data. The similarities between the solar wind and tropospheric effects on apparent signal path length are used to hypothesize a parametric model for low-frequency wet tropospheric path length fluctuation. Experimental observations of wet tropospheric signal delay fluctuations are interpreted as confirmation of this parametric form. The model is used to suggest the appropriate conditions for collection of experimental tropospheric fluctuation data. S.E.S.

N79-12117*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
UPDATED Z-CORRECTIONS FOR 64-m DSS GROUND STATION DELAY CALIBRATIONS c14
T. Y. Otoshi and K. R. Weld *In its* The Deep Space Network 15 Oct. 1978 p 77-84 refs (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 14B

New Z-corrections which resulted from recent translator path delay calibrations made at DSS 14, 43, and 63 with newly developed DSN Portable Zero Delay Assemblies are presented. The test results indicate a successful transfer of technology from development to implementation and to the operations phase. S.E.S.

N79-12118*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystems Section.
DUAL-FREQUENCY FEED CONE ASSEMBLIES FOR 34-METER ANTENNAS c32
R. W. Hartop *In its* The Deep Space Network 15 Oct. 1978 p 85-88 refs (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 09C

New Cassegrain cone assemblies were designed for the upgrade of three 26 meter-diameter antennas to 34 meter-diameter with improved performance. The new dual-frequency feed cone (SXD) provided both S- and X-band feed systems and traveling wave masers with a reflex reflector system to permit simultaneous operation analogous to the 64-meter antennas. Author

N79-12119*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Communications Systems Research Section.
STABLE LOW NOISE VOLTAGE SOURCE c33
G. F. Lutes *In its* The Deep Space Network 15 Oct. 1978 p 89-93 (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 09C

Hum and noise on power sources can have a significant effect on system noise. Filtering to achieve low hum and noise is accomplished at low current levels. The diode regulator circuit is described which is ideal for this type of filtering. Hum and noise rejection is achieved with good output voltage stability in a small, low-cost, reliable circuit. S.E.S.

N79-12120*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Tidbinbilla Deep Space Communications Complex.
AUTOMATED RADIO ASTRONOMY OPERATIONS c37
R. W. Livermore *In its* The Deep Space Network 15 Oct. 1978 p 94-97 (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 13I

The improvements in using a computer to drive a DSN 64-meter antenna are described. The development is used to simplify operation, improve antenna safety, reduce antenna wear, present the abuse of antenna by misoperation, increase quantity and quality of data gathered, and give users a greater choice of automatic operations. Author

N79-12121*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
REPORT ON ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
James I. Vette, ed., Robert W. Vostreys, ed., and Richard Horowitz, ed. Aug. 1978 284 p refs
(NASA-TM-79760; NSSDC/WDC-A-R-and-S-78-04) Avail: NTIS HC A13/MF A01 CSCL 22A

Information is presented, concerning active and planned spacecraft and experiments known to the National Space Science Data Center. The information included a wide range of disciplines: astronomy, earth sciences, meteorology, planetary sciences, aeronomy, particles and fields, solar physics, life sciences, and material sciences. These spacecraft projects represented the efforts and funding of individual countries as well as cooperative arrangements among different countries. J.A.M.

N79-12122*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACELAB MISSION 2 EXPERIMENT DESCRIPTIONS
K. Stuart Clifton, ed. Sep. 1978 67 p Original contains color illustrations
(NASA-TM-78198) Avail: NTIS HC A04/MF A01 CSCL 22A

Thirteen experiments selected to fly on the Spacelab 2 pallets-only mission to demonstrate the capability of the spacecraft to conduct multidisciplinary investigations are described. Individual payload configurations and their arrangement in the payload bay are illustrated. Experiment numbers, titles, disciplines, principal investigators, sponsoring institutions, and the physical characteristics of each payload are listed in tables. Areas of investigation include life sciences, plasma physics, infrared astronomy, high energy physics, solar physics, atmospheric physics, and technology development. Co-investigators are listed in the appendix. A.R.H.

N79-12123*# National Aeronautics and Space Administration, Washington, D. C.
NATO-3C/DELTA LAUNCH
6 Nov. 1978 22 p
(NASA-TM-79884; M-492-207-78-03) Avail: NTIS HC A02/MF A01 CSCL 22A

NATO-3C, the third in a series of NATO defense-related communication satellites, is scheduled to be launched on a delta vehicle from the Eastern Test Range no earlier than November 15, 1978. NATO-3A and -3B were successfully launched by Delta vehicles in April 1976 and January 1977, respectively. The NATO-3C spacecraft will be capable of transmitting voice, data, facsimile, and telex messages among military ground stations. The launch vehicle for the NATO-3C mission will be the Delta 2914 configuration. The launch vehicle is to place the spacecraft in a synchronous transfer orbit. The spacecraft Apogee Kick motor is to be fired at fifth transfer orbit apogee to circularize its orbit at geosynchronous altitude of 35,900 km(22,260 miles) above the equator over the Atlantic Ocean somewhere between 45 and 50 degrees W longitude. G.Y.

N79-12124*# National Aeronautics and Space Administration, Washington, D. C.

DELTA LAUNCH CANADIAN COMMUNICATIONS SATELLITE TELESAT-D (ANIK-B)
30 Nov. 1978 21 p
(NASA-TM-79883; M-492-201-78-04) Avail: NTIS HC A02/MF A01 CSCL 22A

Telesat-D (Anik-B) is the first of a series of three (Telesat-D, -E, -F) second generation satellites developed for Telesat/Canada. These second generation satellites will replace three first generation HS-333 satellites (Telesat-A, -B, -C) developed for Telesat/CNADA AND LAUNCHED BY Delta 2914 vehicles in 1972, 1973, and 1975 and successfully placed in orbit as Anik-A1, -A2, -A3. The Telesat-D(Anik-B) satellite will be place in sync-transfer orbit by a Delta 3914 launch vehicle, currently scheduled for launch on December 15, 1978. The Telesat-E and -F(Anik-C1 and -C2) missions are scheduled for launch on the Space Shuttle in 1981 to replace the function of the Anik-A2 and -A3 (Telesat-B, and -C) satellites. The Anik-B will provide point-to-point voice, TV, and data communications traffic to Canada's ten provinces. G.Y.

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N79-12125*# Analytical Mechanics Associates, Inc., Hampton, Va.
A RECOMMENDED ENTRY RECONSTRUCTION PROCESS FOR THE PIONEER VENUS MULTI-PROBE MISSION
J. T. Findlay and G. M. Kelly Nov. 1978 96 p refs
(Grant NAS1-15055)
(NASA-CR-158962; AMA-78-18) Avail: NTIS HC A05/MF A01 CSCL 22A

A method for determining the entry trajectories for the Pioneer Venus multi-probe mission is presented that utilizes earth based Doppler and onboard accelerometry as observables to provide updates for the spacecraft state and atmospheric parameters. The evolution of this method, based on error analyses and actual simulation results, is discussed. A derivative of the Viking radio science orbit determination software is recommended for the reconstruction. Telemetry data pre-processing requirements were defined. A cubic spline derivative routine is recommended to extract accelerations from the accumulated velocity decrements. G.G.

N79-12126# Aerospace Corp., El Segundo, Calif. Reentry Systems Div.
THE CHALLENGE OF REENTRY VEHICLE INSTRUMENTATION Interim Report
Phillip J. Legendre, Roy G. Fowler, John M. Cassanto (GE), and Wallis R. Grabowsky 31 May 1978 136 p refs
(Contract F04701-77-C-0078)
(AD-A057929; TR-0078(3550-74)-1; SAMSO-TR-78-99) Avail: NTIS HC A07/MF A01 CSCL 16/3

This tutorial presents a summary of the environments, problems, and performance of the on-board instrumentation used on the U.S. Air Force Space and Missile Systems Organization (SAMSO) flight test programs to measure reentry vehicle (RV) performance. In addition, a brief description of the off-board instrumentation will be presented. In RV instrumentation, the specific discipline performance areas covered are the thermodynamic and the aerodynamic. Within the aerodynamic discipline are the group of instruments concerned with RV dynamics (gyros, magnetometers, etc.) and with RV fluid dynamic measurements (boundary layer transition and progression sensors, etc.). The thermodynamic instruments include radiation sensors, multiwire isothermal thermocouples, optical seedants, acoustic sensors, calorimeters, etc. The overriding objective of this tutorial is to provide the instrumentation supplier with a detailed feeling for SAMSO's RV instrumentation problems so that the supplier will be able to propose better instruments to solve these problems. Author (GRA)

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air)*.

N79-12127*# National Aeronautics and Space Administration, Washington, D. C.
MOONPORT: A HISTORY OF APOLLO LAUNCH FACILITIES AND OPERATIONS
Charles D. Benson and William Barnaby Faherty 1978 643 p refs
(NASA-SP-4204) Avail: NTIS MF A01; SOD HC CSCL 22D

The development of the Apollo f launch facilities and launch operations is described from the beginning of design through the final launch. Management techniques, innovation in automation, and testing on the ground to avoid failures in space are among the topics covered. The impact of the Apollo program on the citrus groves and quiet beaches of Florida's east coast is included. J.M.S.

N79-12106*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Office of Tracking and Data Acquisition.
NETWORK FUNCTIONS AND FACILITIES
N. A. Renzetti *In its* The Deep Space Network 15 Oct. 1978 p 1-3 (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 14B

N79-12108*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Deep Space Network Operations Office.
VIKING EXTENDED MISSION SUPPORT
R. L. Gillette *In its* The Deep Space Network 15 Oct. 1978 p 15-20 (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 22A

N79-12109*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. TDA Mission Support Office.
PIONEER 10 AND 11 MISSION SUPPORT
R. B. Miller *In its* The Deep Space Network 15 Oct. 1978 p 21-25 refs (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 14B

N79-12110*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
HELIOS MISSION SUPPORT
P. S. Goodwin, W. N. Jensen, and G. M. Rockwell *In its* The Deep Space Network 15 Oct. 1978 p 26-28 (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 14B

N79-12117*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
UPDATED Z-CORRECTIONS FOR 64-m DSS GROUND STATION DELAY CALIBRATIONS
T. Y. Otoshi and K. R. Weld *In its* The Deep Space Network 15 Oct. 1978 p 77-84 refs (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 14B

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N79-12128*# Development Sciences, Inc., City of Industry, Calif.
A CONCEPT STUDY OF A REMOTELY PILOTED VEHICLE FOR MARS EXPLORATION Final Technical Report
1 Aug. 1978 139 p ref
(Contract JPL-955012)
(NASA-CR-157942) Avail: NTIS HC A07/MF A01 CSCL 22A

Candidate configurations are discussed for shuttle-transported, spacecraft-deployed remotely piloted vehicles having individual aeroshells, parachutes, and scientific payloads for Mars exploration. Topics covered include aerodynamics; powerplants; structural materials; deployment and descent interface systems; payloads; secondary power; thermal control; navigation, guidance and control, communications, weight and center of gravity; performance; and flight testing. The advantages of the recommended electric-powered cruiser/lander configuration are summarized.
A.P.H.

N79-12129*# National Aeronautics and Space Administration, Washington, D. C.
OTRAG ROCKET EXPERIMENTS IN AFRICA
Dec. 1978 34 p Transl. into ENGLISH from Der Spiegel (West Germany), no. 33, 1978 p 52-65 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-75376) Avail: NTIS HC A03/MF A01 CSCL 16D

West German rocket manufacturers are testing their products in Zaire. Hundreds of pipes (12 m x 80 cm) are bundled together inside the test missiles, which are fired into Zaire's prairie. The reactions of neighboring nations, as well as leading countries of the world, are presented concerning the rocket tests.
J.A.M.

N79-12130*# LinCom Corp., Pasadena, Calif.
AUTOMATIC PHASE CONTROL IN SOLAR POWER SATELLITE SYSTEMS Final Report
W. C. Lindsey and A. V. Kantak 15 Feb. 1978 130 p refs
(Contract NAS9-15237)
(NASA-CR-151856; TR-7802-0977) Avail: NTIS HC A07/MF A01 CSCL 22B

Various approaches to the problem of generating, maintaining and distributing a coherent, reference phase signal over a large area are suggested, mathematically modeled and analyzed with respect to their ability to minimize: phase build-up, beam diffusion and beam steering phase jitter, cable length, and maximize power transfer efficiency. In addition, phase control configurations are suggested which alleviate the need for layout symmetry.
J.M.S.

N79-12131# National Environmental Satellite Center, Washington, D. C.
SATELLITE ACTIVITIES OF NOAA 1977
Apr. 1978 22 p
Avail: NTIS HC A02/MF A01

To make sure the earth will continue to serve and sustain its people, NOAA pursues a variety of programs. These include operating, maintaining, and improving the operational environmental satellite systems; providing data to assess the impact of natural and people-induced factors on such things as global food supplies, national energy problems, and environmental quality; conducting fundamental research to improve our understanding of the environment; using satellite data and aerial photography for charting, coastal mapping, and geodetic research; improving weather services through the automation of forecast and observation stations, better radar systems, and continued atmospheric research; and improving the assessment and conservation of all living marine resources.
J.A.M.

N79-12132# Air Force Geophysics Lab., Hanscom AFB, Mass.
SPACECRAFT CHARGING AT GEOSYNCHRONOUS ORBIT: SOLUTION FOR ECLIPSE PASSAGE Air Force Surveys in Geophysics
Henry Berry Garrett and Allen G. Rubin 15 May 1978 17 p refs
(AF Proj. 7661)
(AD-A058983; AFGL-TR-78-0122; AFGL-AFSG-389) Avail: NTIS HC A02/MF A01 CSCL 20/3

Rapid variations in spacecraft potential are observed on entry and exit from the earth's shadow. Generalized equations, based on elementary plasma probe theory, are developed which make quantitative estimates of these potentials as a function of satellite position in the earth's penumbra, and are compared with data from the ATS-5 and ATS-6 geosynchronous satellites. The agreement between the observations and the predictions results from the approximate constancy of the ratio of the ambient ion to electron current during injection events. Due to the significant size and shape differences of the ATS-5 and ATS-6 satellites, the results are applicable in many space physics situations such as estimating the effects of electron beams on satellite potential and of spacecraft charging on very large space structures.
Author (GRA)

N79-12133# Air Force Geophysics Lab., Hanscom AFB, Mass.
EFFECTS OF A TIME-VARYING PHOTOELECTRON FLUX ON SPACECRAFT POTENTIAL
Henry Berry Garrett 15 May 1978 30 p refs
(AD-A058993; AFGL-TR-78-0119; AFGL-AFSG-388) Avail: NTIS HC A03/MF A01 CSCL 20/3

Analysis of plasma data from the geosynchronous satellites ATS-5 and ATS-6 shows that the satellites vary rapidly in potential as they pass into and out of the earth's shadow. These variations result from the loss of photoelectrons as the sun is eclipsed. A model of this phenomenon which includes the effects of atmospheric attenuation of the solar flux between 1000 A and 3000 A and spacecraft charge buildup is used to predict the potential variations observed by ATS-5 and ATS-6. The model predicts potentials within - or - 700 V of the observed potentials in the range -100 V to -10,000 V.
Author (GRA)

N79-12134# Air Force Geophysics Lab., Hanscom AFB, Mass.
SOUNDING ROCKET FLIGHT DATA SUMMARY, 1966-1976
C. Nelson Stark and Alan K. Williams 15 May 1978 62 p
(AF Proj. 7659)
(AD-A059005; AFGL-TR-78-0120; AFGL-SR-213) Avail: NTIS HC A04/MF A01 CSCL 22/2

This report is a summary listing of all AFGL sounding rockets launched from 1966 to 1976. Listed data includes the launch time, date, place, and number; the type of rocket launched; the name of the project scientist; the impact time, range, azimuth, apogee time, and altitude; payload weight and length; the recovery, ACS type, and performance; experiments flown; support systems; remarks; and total vehicle performance.
Author (GRA)

N79-12135# National Environmental Satellite Service, Washington, D. C.
THE TIROS-N/NOAA A-G SATELLITE SERIES
Arthur Schwalb Mar. 1978 86 p
(PB-283859/7; NOAA-TM-NESS-95; NOAA-78061503) Avail: NTIS HC A05/MF A01 CSCL 22B

The TIROS-N satellite is scheduled for launch in mid-1978. The third generation environmental satellite will carry instruments that can provide data to meet state requirements in support of both day-to-day environmental monitoring and global research programs. The satellite system is a cooperative effort of the United States, The United Kingdom and France. General information about the spacecraft, its orbit, and its instruments are presented. Details on the realtime data links are included for those planning to receive these data from the spacecraft.
GRA

N79-12486# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
SATELLITE TRACKING TECHNIQUES AND THEIR APPLICATIONS FOR GEODESY AND NAVIGATION
P. Wilson *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 93-97 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12507# Groupe de Recherche de Geodesie Spatiale, Grasse (France).
NON GRAVITATIONAL FORCES ON AN ARTIFICIAL SATELLITE
F. Barlier *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 267-269 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12508# Institut Royal Meteorologique de Belgique, Brussels.
UTILISATION OF A SUPER CACTUS ACCELEROMETER MOUNTED ON A SATELLITE FOR THE DIRECT OBSERVATION OF THE RADIATION BALANCE [UTILISATION D'UN

ACCELEROMETRE SUPER CACTUS MONTE SUR UN SATELLITE POUR L'OBSERVATION DIRECTE DU BILAN RADIATIF]
D. Crommelynck *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 271-273 refs In FRENCH (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12511# Istituto Elettrotecnico Nazionale (Galileo Ferraris), Turin (Italy).
TIMING VIA SATELLITES
S. Leschiutta *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 299-309 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N79-12136*# Lockheed Missiles and Space Co., Sunnyvale, Calif. Space Systems Div.
ASSESSMENT OF SEPS SOLAR ARRAY TECHNOLOGY FOR ORBITAL SERVICE MODULE APPLICATION Final Topical Report
30 Oct. 1978 153 p refs
(Contract NAS9-15595)
(NASA-CR-151859; LMSC-D665410) Avail: NTIS HC A08/MF A01 CSCL 22B

Work performed in the following assessment areas on the SEPS solar array is reported: (1) requirements definition, (2) electrical design evaluation, (3) mechanical design evaluation, and (4) design modification analysis. General overall assessment conclusions are summarized. There are no known serious design limitations involved in the implementation of the recommended design modifications. A section of orbiter and array engineering drawings is included. S.B.S.

N79-12137*# TRW Defense and Space Systems Group, Houston, Tex. Systems Engineering and Analysis Department.
ENGINEERING DESCRIPTION OF THE OMS/RCS/DAP MODES USED IN THE HP-9825A HIGH FIDELITY RELATIVE MOTION PROGRAM (HFRMP)
S. W. Wilson 6 Oct. 1978 77 p refs
(Contract NAS9-14723)
(NASA-CR-151855; TRW-28415-H009-RO-00) Avail: NTIS HC A05/MF A01 CSCL 22A

Simplified mathematical models are reported for the space shuttle's Orbital Maneuvering System (OMS), Reaction Control System (RCS), and on-orbit Digital Autopilot (DAP) that have been incorporated in the High-Fidelity Relative Motion Program (HFRMP) for the HP-9825A desk-top calculator. Comparisons were made between data generated by the HFRMP and by the Space Shuttle Functional Simulator (SSFS), which models the cited shuttle systems in much greater detail. These data include propellant requirements for representative translational maneuvers, rotational maneuvers, and attitude maintenance options. Also included are data relating to on-orbit trajectory deviations induced by RCS translational cross coupling. Potential close-range stationkeeping problems that are suggested by HFRMP simulations of 80 millisecond (as opposed to 40 millisecond) DAP cycle effects are described. The principal function of the HFRMP is to serve as a flight design tool in the area of proximity operations. G.G.

N79-12138*# LinCom Corp., Pasadena, Calif.
SHUTTLE GPS R/PA EVALUATION ANALYSIS AND PERFORMANCE TRADEOFF STUDY Final Report
R. W. D. Booth and W. C. Lindsey 8 Sep. 1978 65 p ref
(Contract NAS9-15492)
(NASA-CR-151854; TR-0978-0278) Avail: NTIS HC A04/MF A01 CSCL 22A

Primary responsibility was understanding and analyzing the various GPS receiver functions as they relate to the shuttle environment. These receiver functions included acquisition properties of the sequential detector, acquisition and tracking properties of the various receiver phase locked loops, and the techniques of sequential receiver operation. In addition to these areas, support was provided in the areas of oscillator stability requirements, antenna management, and navigation filter requirements, including preposition aiding. J.A.M.

N79-12139*# ARO, Inc., Arnold Air Force Station, Tenn.
TEST RESULTS FROM THE NASA/ROCKWELL INTERNATIONAL SPACE SHUTTLE INTEGRATED VEHICLE TEST (IH 85) CONDUCTED IN THE AEDC-VKF TUNNEL A Final Report
Kenneth W. Nutt AEDC Jun. 1978 44 p refs Sponsored by NASA
(NASA-CR-157622; AD-A058141; AEDC-TSR-78-V15) Avail: NTIS HC A03/MF A01 CSCL 25/2

Tests were conducted to obtain convective heat-transfer-rate distributions on the Space Shuttle Integrated Vehicle during simulated first and second stage conditions of the flight profile. The test model was a 0.0175-scale model (60-OTS). Model configurations tested included the Integrated Vehicle and the Orbiter/External Tank with the Solid Rocket Boosters removed. The tests were conducted at Mach numbers 3 and 4 using the thin-skin thermocouple technique. The model was tested at angles of attack of 0, - or - 2.5, and or - 5 deg and at yaw angles of 0, - or - 3, - or 4.5, - or - 5, - or - 7.5, and - or - 9 deg. A test description is presented. GRA

N79-12140# General Accounting Office, Washington, D. C. Procurement and Systems Acquisition Div.
A SECOND LAUNCH SITE FOR THE SHUTTLE. AN ANALYSIS OF NEEDS FOR THE NATION'S SPACE PROGRAM
4 Aug. 1978 89 p
(PB-284306/8; PSAD-78-57) Avail: NTIS HC A05/MF A01 CSCL 22B

The need for two space shuttle launch sites and the number of shuttle orbiters needed to support the Nation's space program during the next decade is examined. Billions of dollars could be saved if planned operations at Vandenberg Air Force Base in California were transferred to Kennedy Space Center in Florida and if fiscal year 1979 funds to start construction of another orbiter were eliminated. The Vandenberg site should not be funded unless there are compelling national security reasons, nor should more than the four shuttle vehicles presently under development and production be funded. GRA

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N79-12141 Texas Technological Univ., Lubbock.
A MINIATURIZED DIGITAL TELEMETRY SYSTEM FOR PHYSIOLOGICAL DATA TRANSMISSION Ph.D. Thesis
Lawrence Jennings Stotts 1978 57 p
Avail: Univ. Microfilms Order No. 7819903

The design and construction of a thirteen channel, PCM telemetry system are reported. In addition, a two-way, FM voice communication channel was provided as well as a transponder channel that allows control of power to all subsystems by the earth based station. The actual system consists of a portable unit, worn by the astronaut, and a ground base station that is used to receive, decode, and channel the received data into the vehicle's repeater system. The portable unit is equipped to handle three leads of ECG. Upon command from the ground base station, a calibration signal is applied to all signal conditioners.

VOX control of voice is also provided in the portable unit.
Dissert. Abstr.

N79-12114*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Communications Systems Research Section.
SOFT DECISION DECODING OF BLOCK CODES
L. D. Baumert and R. J. McEliece *In its* The Deep Space Network 15 Oct. 1978 p 60-64 refs (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 17B

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

N79-12142*# National Aeronautics and Space Administration, Washington, D. C.
EXPERIMENTAL RESULTS ON MASS-THICKNESS DISTRIBUTION IN SPACECRAFT EQUIPMENT
V. V. Bodin, N. N. Repin, V. A. Sakovich, and V. M. Sakharov Nov. 1978 13 p refs Transl. into ENGLISH of "Eksperimentalnyye Resultaty Raspredeleniya Tolshcin Materiala v Oborudovanii Kosmicheskikh Letatelnykh Apparatov', Rept. 1978 9 p Presented at 2d All-Union Scientific Conf. on Protection from Ionizing Radiations of Nuclear Installations, Section 5-M, 1978 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-75593) Avail: NTIS HC A02/MF A01 CSCL 22B

A technique is described for evaluating the shielding properties of spacecraft equipment with respect to cosmic radiation. A gamma-ray source is used in conjunction with a scintillation detector to determine mass-thickness distribution both in plane geometry for equipment units, and in spherical geometry for given points within the spacecraft. Equations are presented for calculating mass-thickness distribution functions, and the results are compared with experimental measurements. Author

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

No abstracts in this category.

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion*, *28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

N79-12143 Vanderbilt Univ., Nashville, Tenn.
A THREE-DIMENSIONAL FINITE ELEMENT ANALYSIS TO PREDICT THE INSTABILITY OF SOLID PROPELLANT ROCKET MOTORS Ph.D. Thesis
Radwan Sadi Juruf 1978 228 p
Avail: Univ. Microfilms Order No. 7823456

An integrated and general three-dimensional finite element computer code to analyze a cavity-solid propellant configuration of a solid rocket was developed to predict whether it is stable or unstable. A cavity-solid propellant configuration of a solid rocket is analyzed at several instances of time after the rocket is fired. The parameters of the configuration are input into the program at each instant of time desired. The developed code will then calculate the natural circular frequency, the solid propellant damping rate, and the acoustical pressures inside the cavity for every mode desired. At a particular instant of time the developed code will calculate the potential flow inside the cavity, the velocities of the gas flowing into the cavity from the burning surface, and finally, the growth/decay coefficient for each mode in order to establish whether a mode is stable or unstable. Dissert. Abstr.

N79-12144# Atlantic Research Corp., Alexandria, Va.
A-B PLANE PG THROAT INSERTS Interim Report, Dec. 1974 - Nov. 1975
Philip A. Tomlinson, James W. Murray, and James O. Bird Jun. 1978 475 p refs
(Contract F04611-75-C-0008; AF Proj. 672A)
(AD-A058044; NDR-5649-4-76; AFRPL-TR-77-47) Avail: NTIS HC A20/MF A01 CSCL 21/8

An exploratory program was conducted to design and develop free standing a-b plane pyrolytic graphite throat inserts for rocket nozzles. Thermal analysis and structural analysis were conducted to define and establish design concepts for nozzle inserts. Free standing a-b plane continuously nucleated pyrolytic graphite cylinders were fabricated and characterized to determine the thermal and mechanical properties over range of temperatures from 70 F to 5000 F. Failure criteria were investigated and the predictions were compared with the results of pyrolytic graphite throat inserts which fractured during cooldown. The throat insert configuration was defined and thirteen deposition runs were made to produce the throat inserts. All inserts fabricated were unacceptable for nozzle testing due to cracks and/or delaminations which occurred during cooldown. Author (GRA)

N79-12145# Naval Postgraduate School, Monterey, Calif.
AN EXPERIMENTAL INVESTIGATION OF THE DUAL CHAMBER ROCKET M.S. Thesis
James Francis McFillin, Jr. Jun. 1978 55 p refs
(AD-A057489) Avail: NTIS HC A04/MF A01 CSCL 21/8

An experimental investigation was conducted to determine the feasibility and practicality of the dual rocket motor concept. Cold flow studies were performed with the aid of a ground-test simulator which incorporated a telescoping booster cavity. The effects of booster cavity length, booster cavity shockdown pressure, booster/sustainer nozzle area ratios, and aft nozzle removal on thrust and performance were explored and discussed. Author (GRA)

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

No abstracts in this category.

24 COMPOSITE MATERIALS

Includes laminates.

N79-12146 Purdue Univ., Lafayette, Ind.
STRUCTURAL BEHAVIOR OF LAYERED COMPOSITES OF NONLINEAR MATERIALS Ph.D. Thesis
Wei-Han Feng 1978 176 p
Avail: Univ. Microfilms Order No. 7821445

The fiber-reinforced composite is modeled by a medium consisting of layers of a nonlinear matrix alternating with effective fibrous layers of linearly elastic material. A set of three dimensional

constitutive equations for the gross composite is derived. The propagation of shear waves through the nonlinear composite medium is studied. The stability of the shock front, the growth and decay of the shock waves, the distortion of the sinusoidal wave, and the particle velocity of the acceleration wave are investigated. A sandwich beam with a core of nonlinearly elastic material is considered. Equations of motion are derived for this case. A forced vibration problem of a sandwich beam subjected to a harmonic load is studied. A simplified nonlinear sandwich beam theory for small deflection is developed.
Dissert. Abstr.

N79-12147 Texas Technological Univ., Lubbock.
DEVELOPMENT OF PREDICTIVE MODELS FOR DRILLING COMPOSITE MATERIALS Ph.D. Thesis
Somkiet Rujikietgumjorn 1978 297 p
Avail: Univ. Microfilms Order No. 7819898

Carbide insert twist drills were investigated for drilling graphite/epoxy-titanium hybrid composite. The independent variables considered were speed, feed, point angle, and nominal relief angle. The responses investigated included tool life, tool forces, and hole quality characteristics. Complete failure criterion was chosen to determine the end of drill life. In establishing the predictive equations, response surface methodology was used. The central composite design was selected for developing the models. The use of the predictive equations for finding the optimal machining parameters for the minimum cost per part or maximum production rate criterion was demonstrated by utilizing the geometric programming technique. Dissert. Abstr.

N79-12148*# Technochemie G.m.b.H., Heidelberg (West Germany). Verfahrenstechnik.
BISMALEIMIDE RESINS FOR FLAME RESISTANT HONEYCOMB SANDWICH PANELS Quarterly Progress Report
30 Mar. 1978 17 p
(Contract NASw-3081)
(NASA-CR-157935; QPR-3) Avail: NTIS HC A02/MF A02 CSCL 11D

A 60 kg batch of Resin M751 was produced in pilot plant scale. The resin was delivered to the prepreg company as an NMP solution. 100 kg of glass-fabric prepregs were fabricated. Prepreg characteristics and curing cycles for laminate fabrication were provided. A new batch of Resin M756 (Code M756 - 2) was synthesized. G.G.

N79-12149*# Clemson Univ., S.C. Dept. of Mechanical Engineering.
FRACTURE AND CRACK GROWTH IN ORTHOTROPIC LAMINATES
James G. Goree and Robert S. Gross 15 Oct. 1978 49 p refs
(Grant NsG-1297)
(NASA-CR-157424) Avail: NTIS HC A03/MF A01 CSCL 11D

An approximate solution is developed for the determination of the interlaminar normal and shear stresses in the vicinity of a crack in a three dimensional composite containing unidirectional linearly elastic fibers in an infinite linearly elastic matrix. In order to reduce the complexity of the formulation, certain assumptions are made as to the physically significant stresses to be retained. These simplifications reduce the partial differential equations of elasticity to differential-difference equations which are tractable using Fourier transform techniques. The potential for damaged or debonded zones to be generated by an embedded crack is discussed, and stress concentration factors for fibers near the crack are given. Detailed comparisons are made between the present solution, the analogous two dimensional problem, and corresponding shear-lag models. L.S.

N79-12150*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
STATUS REVIEW OF PMR POLYIMIDES
Tito T. Serafini 1978 8 p refs Proposed for presentation at the Symp. on Resins for Aerospace at the Am. Chem. Soc./Chem. Soc. of Japan Chem. Congr., Honolulu, 1-6 Apr. 1979
(NASA-TM-79039; E-9841) Avail: NTIS HC A02/MF A01 CSCL 11D

The current status of first and second generation PMR polyimides are reviewed. Synthesis, processing, and applications were considered, using prepreg materials based on processable, high temperature resistant polyimides. J.A.M.

N79-12151*# Boeing Commercial Airplane Co., Seattle, Wash.
DEVELOPMENT OF AIRCRAFT LAVATORY COMPARTMENTS WITH IMPROVED FIRE RESISTANCE CHARACTERISTICS, PHASE 1: FIRE CONTAINMENT TEST OF A WIDE BODY AIRCRAFT LAVATORY MODULE Final Report
R. A. Anderson, D. B. Arnold, G. A. Johnson, and E. A. Tustin Jul. 1978 84 p
(Contract NAS2-8700)
(NASA-CR-152074; D6-44885) Avail: NTIS HC A05/MF A01 CSCL 11D

A test was conducted to evaluate the fire containment characteristics of a Boeing 747 lavatory module. Results showed that the fire was contained within the lavatory during the 30-minute test period with the door closed. The resistance of the lavatory wall and ceiling panels and general lavatory construction to burn-through under the test conditions was demonstrated. Author

N79-12152*# National Aeronautics and Space Administration, Washington, D. C.
HEAT AND MOISTURE FLOW IN CONCRETE AS A FUNCTION OF TEMPERATURE
Juergen Hundt Nov. 1978 214 p refs Transl. into ENGLISH of "Waerme- und Feuchtigkeitsleitung in Beton unter Einwirkung eines Temperaturgefaelles", Rept-256 Ger. Comm. for Reinforced Concrete, Berlin, 1975 108 p Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-75286; Rept-256) Avail: NTIS HC A10/MF A01 CSCL 11D

Due to temperature, reactors in operation cause heat and moisture flows in the thick walled prestressed pressure vessels. These flows were studied in three beams of concrete made with crushed limestone aggregate, and in three beams made of crushed gravel/sand aggregate. The flow phenomena were related to the structural development of the concrete by determining the amount of non-evaporatable water, the total porosity, and the pore size distribution. Local temperature and moisture conditions also influenced the technical properties. Compressive strength, changes in length due to shrinkage and contraction, thermal expansion, and thermal conductivity were determined.
G.G.

N79-12153*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EVALUATION OF MANUFACTURING PROCESSES FOR BORON/ALUMINUM COMPOSITES CONTAINING 0.2-mm-DIAMETER BORON FIBERS
Thomas J. Moore and Paul E. Moorhead Nov. 1978 55 p
(NASA-TM-79008; E-9792) Avail: NTIS HC A04/MF A01 CSCL 11D

The effects of starting materials and fabrication techniques on the properties and cost of producing boron/aluminum (B/Al) composite panels containing 0.2-mm-diameter boron fibers are evaluated. The boron fibers were obtained from a single supplier. Five kinds of B/Al tape were used to produce 105, 8-ply panels. Consolidation was accomplished by hot pressing in air or in vacuum. Nondestructive and destructive tests included room-temperature tensile tests. On the basis of an evaluation of the test results and relative cost estimates, two kinds of tape were selected for use: fugitive binder tape and dry woven tape.
G.G.

N79-12154*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FRACTURE MODES IN OFF-AXIS FIBER COMPOSITES
J. H. Sinclair and C. C. Chamis 1978 25 p refs Proposed for presentation at the 34th Ann. Conf. of the SPI Reinforced Plastics/Composites Inst., New Orleans, 29 Jan. - 2 Feb. 1979
(NASA-TM-79036; E-9836) Avail: NTIS HC A02/MF A01 CSCL 11D

Criteria were developed for identifying, characterizing, and quantifying fracture modes in high-modulus graphite-fiber/resin unidirectional composites subjected to off-axis tensile loading.

Procedures are described which use sensitivity analyses and off-axis data to determine the uniaxial strength of fiber composites. It was found that off-axis composites fail by three fracture modes which produce unique fracture surface characteristics. The stress that dominates each fracture mode and the load angle range of its dominance can be identified. Linear composite mechanics is adequate to describe quantitatively the mechanical behavior of off-axis composites. The uniaxial strengths predicted from off-axis data are comparable to these measured in uniaxial tests. G.Y.

N79-12155*# Lehigh Univ., Bethlehem, Pa.
STRESS INTENSITY FACTORS FOR BONDED ORTHOTROPIC STRIPS WITH CRACKS
F. Delale and F. Erdogan Jun. 1978 51 p refs
(Grants NGR-39-007-011; NSF ENG-77-19127)
(NASA-CR-157143) Avail: NTIS HC A04/MF A01 CSCL 11D

The elastostatic problem for a nonhomogeneous plane which consists of two sets of periodically arranged dissimilar orthotropic strips is considered. It is assumed that the plane contains a series of collinear cracks perpendicular to the interfaces and is loaded in tension away from and perpendicular to the cracks. Cracks fully imbedded into the homogenous strips were analyzed as well as the singular behavior of the stresses for two special crack geometries. The analysis of cracks crossing interfaces indicates that, for certain orthotropic material combinations, the stress state at the point of intersection of a crack and an interface may be bounded. A number of numerical examples are worked out in order to separate the primary material parameters influencing the stress intensity factors and the powers of stress singularity, and to determine the trends regarding the influence of the secondary parameters. A.R.H.

N79-12156*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
REPRODUCIBILITY OF STRUCTURAL STRENGTH AND STIFFNESS FOR GRAPHITE-EPOXY AIRCRAFT SPOILERS
William E. Howell and Charles D. Reese (Kansas Univ., Lawrence) Nov. 1978 23 p refs
(NASA-TM-78723) Avail: NTIS HC A02/MF A01 CSCL 11D

Structural strength reproducibility of graphite epoxy composite spoilers for the Boeing 737 aircraft was evaluated by statically loading fifteen spoilers to failure at conditions simulating aerodynamic loads. Spoiler strength and stiffness data were statistically modeled using a two parameter Weibull distribution function. Shape parameter values calculated for the composite spoiler strength and stiffness were within the range of corresponding shape parameter values calculated for material property data of composite laminates. This agreement showed that reproducibility of full scale component structural properties was within the reproducibility range of data from material property tests. Author

N79-12157*# Lehigh Univ., Bethlehem, Pa.
STRESS INTENSITY FACTORS FOR AN INCLINED CRACK IN AN ORTHOTROPIC STRIP
F. Delale (Istanbul Macka Technical Univ., Turkey), I. Bakirtas (Istanbul Macka Technical Univ., Turkey), and F. Erdogan Apr. 1978 29 p refs
(Grants NGR-39-007-011; NSF ENG-77-19127)
(NASA-CR-157141) Avail: NTIS HC A03/MF A01 CSCL 11D

The elastostatic problem for an infinite orthotropic strip containing a crack is considered. It is assumed that the orthogonal axes of material orthotropy may have an arbitrary angular orientation with respect to the orthogonal axes of geometric symmetry of the uncracked strip. The crack is located along an axis of orthotropy, hence at an arbitrary angle with respect to the sides of the strip. The general problem is formulated in terms of a system of singular integral equations for arbitrary crack surface tractions. As examples Modes I and II stress intensity factors are calculated for the strip having an internal or an edge crack with various lengths and angular orientations. In most calculations uniform tension or uniform bending away from the crack region is used as the external load. Limited results are also given for uniform normal or shear tractions on the crack surface. Author

N79-12158# Douglas Aircraft Co., Inc., Long Beach, Calif.
INTERACTIVE COMPOSITE JOINT DESIGN. PART 3: PROGRAMMING MANUAL Final Technical Report, Apr. 1976 - Apr. 1978
M. K. Smith, L. J. Hart-Smith, and C. G. Dietz Apr. 1978 178 p
(Contract F33615-76-C-3058; AF Proj. 2401)
(AD-A058024; MDC-J7908-PT3; AFFDL-TR-78-38-PT-3) Avail: NTIS HC A09/MF A01 CSCL 13/5

A computing technique was developed to determine the feasibility of combining the several batch computer programs for the analysis of composite joints into one interactive computer program utilizing graphics display. This approach proved successful and produced a design tool for the analysis of bolted or bonded composite joints. The program utilizes the software package provided by TEKTRONIX for the graphics display. The user works at the remote on-line graphics terminal in conjunction with the main computing facilities which contain the program. The final report discusses the summary, conclusion, and recommendations of the work performed. The User's Manual and Programming Manual discuss the input, output, and function of the program. Author (GRA)

N79-12159# Boeing Aerospace Co., Seattle, Wash. Research and Engineering Div.
DEVELOPMENT OF HYBRID THERMOPLASTIC COMPOSITES Final Report
J. T. Hoggatt and Sylvester G. Hill Mar. 1977 83 p refs
(Contract N00019-76-C-0171)
(AD-A058328; D180-18752-3) Avail: NTIS HC A05/MF A01 CSCL 11/9

This program was a three-phase effort. Phase 1 was devoted to evaluatiing compatible fiber surface finishes for thermoplastic matrices. Three polysulfone resins (P-1700, PKXA.41 and PKXA.24) from Union Carbide were evaluated. Under Phase 2 graphite reinforced thermoplastic composites were evaluated for stress cracking in various service environments. Methods were also studied for providing a protective metallic or polymeric clad surface on the thermoplastic laminates. Specimens were exposed to various aircraft fluids and then tested for residual properties. Phase 3 of the program was devoted to hybridizing graphite reinforced thermoplastic laminates with Kevlar and glass reinforcements. The structural potential of the hybrid systems was assessed before and after exposure to critical service environments. Three tests showed no deficiencies that would preclude the use of hybrids on structural components. GRA

N79-12160# Rockwell International Corp., Thousand Oaks, Calif. Science Center.
IMPACT DAMAGE IN CARBON COMPOSITES: EFFECT OF MICROSTRUCTURE Final Report, 1 May 1976 - 30 Apr. 1978
A. G. Evans, W. F. Adler, L. J. Hageman, and G. Gurtman 6 Jul. 1978 80 p refs
(Contract N00014-76-C-0854)
(AD-A057323; SC5076-5FR) Avail: NTIS HC A05/MF A01 CSCL 11/5

The penetration damage created in carbon composites with a range of microstructures has been characterized for both quasi-static and dynamic conditions. Several quasi-static properties of the composites have also been measured. Analyses of the quasi-static penetration have been developed, which appear to present a consistent interpretation of the damage and its relation to the quasi-static properties. A preliminary numerical computation of the dynamic damage has been conducted, with encouraging results. Suggestions for microstructural modifications that should enhance the damage resistance have been made, based on the results of both the observations and analyses. Author (GRA)

N79-12161# Notre Dame Univ., Ind.
ELECTROMAGNETIC PROPERTIES AND EFFECTS OF ADVANCED COMPOSITE MATERIALS: MEASUREMENT AND MODELING Phase Report, 1 Oct. 1976 - 30 Sep. 1977
J. L. Allen (South Fla. Univ.), A. T. Adams (Syracuse Univ.), W. J. Gajda, R. E. Heintz (Rochester Inst. of Technol.), W. F. Walker (Rochester Inst. of Technol.), O. Graham (AF Acad.), and J. E.

Erickson (AF Acad.) Griffiss AFB, N. Y. RADC Jun. 1978 172 p refs Prepared for Syracuse Univ., Georgia Inst. of Technol., and State Univ. of N. Y. at Buffalo
(Contracts F30602-75-C-0121; F30602-75-C-0118; F30602-75-C-0122)
(AD-A058041; RADC-TR-78-156) Avail: NTIS HC A08/MF A01 CSCL 11/4

This report covers several areas: (1) Electromagnetic properties of composite materials are given for the range DC to 30 MHz; (2) Techniques of measurement are discussed in the range DC to 1 GHz; and (3) Electromagnetic shielding theory is discussed, surface transfer impedance and the two loop method are related to the conductivity. A matrix method for the calculation of shielding effectiveness for laminated anisotropic materials (perpendicular incidence) is presented; (4) The modification required by the method of moments to allow calculation involving non-perfect conductors are discussed; and (5) A comparison of antenna patterns over a graphite/epoxy ground plane and an aluminum ground plane for dipole and monopole antennas at 370 MHz and 837 MHz is given. Author (GRA)

N79-12162# British Aerospace Dynamics (Space), Stevenage (England).
CARBON FIBRE STUDY NO. 5: AN INVESTIGATION INTO THE HYDROTHERMAL DEGRADATION OF CARBON FIBRE COMPOSITES
M. F. Rickett, comp., N. L. Hancox, comp., and D. C. C. Minty, comp. Paris ESA May 1978 45 p refs Prepared jointly with Atomic Energy Res. Estab.
(Contract ESTEC-2921/76-NL-PP(SC))
(BAe-TP-7679; ESA-CR(P)-1100) Avail: NTIS HC A03/MF A01

The effects of hydrothermal degradation on carbon fiber resin matrix composites was surveyed. It was noted that exposure to water or high relative humidities caused a fall-off in mechanical properties, and this was enhanced by increasing temperature. The reversibility of the effects depended on the property measured; the effects on fiber dominated properties tended to be reversible, but those on matrix dominated were not. Degradation is believed to be caused by water swelling of the resin causing cracking and disruption of the fiber/matrix bond. Flexural modulus strength, and interlaminar shear strength decreased after exposure to temperature, or temperature and water, but that complete drying restored properties to their initial values. The transverse flexural strength, was not restored on drying out, indicating that the resin, or bond, or both, did suffer permanent environmentally-induced damage. Generally the effect of temperature alone was more severe than that of temperature plus water, and it is suggested that in the latter case the presence of the water eased in-built stresses. Author (ESA)

N79-12163# British Aerospace Dynamics (Space), Stevenage (England).
CARBON FIBRE STUDY NO. 4: FAILURE CRITERIA OF CFRP COMPOSITES AT CRYOGENIC TEMPERATURES
M. F. Rickett, comp., N. L. Hancox, comp., and D. C. C. Minty, comp. Paris ESA May 1978 193 p refs Prepared jointly with Atomic Energy Res. Estab.
(Contract ESTEC-2931/76-NL-PP(SC))
(BAe-TP-7678; ESA-CR(P)-1101) Avail: NTIS HC A09/MF A01

Tests performed during the Spacelab support research and technology program involving a Carbon Fibre Reinforced Plastic (CFRP) faced honeycomb panel were rerun using an improved experimental technique. The original theoretical analysis was revised using CFRP material parameters derived from a separate coupon test program. Results show only small changes in material properties with decreasing temperatures. Discrepancies that were found between theoretical and practical panel performance were put down to anomalous expansion coefficients and detail model problems. Author (ESA)

N79-12164# ARGOS Associates, Inc., Winchester, Mass.
TECHNOLOGY ASSESSMENT OF ADVANCED COMPOSITE MATERIALS, PHASE 1 Final Report
Robert Kaiser Apr. 1978 238 p refs
(Grant NSF ERS-77-19467)
(PB-283416/6; NSF/RA-780053) Avail: NTIS HC A11/MF A01 CSCL 11D

The following conclusions were made: (1) The principal high performance fibers currently used in advanced composites are graphite, aramid, and boron. (2) In the future, these will be supplemented by other high strength fibers such as alumina, silicon carbide, and boron nitride. (3) Organic matrix composites, which are evolutionary products of fiberglass reinforced plastics, predominate the technology. (4) Carbon matrix composites, now mainly used in missile components and aircraft brakes, may find medical use as implantable substitutes for bone structures. (5) Metal matrix composites are currently used in aerospace applications of a developmental nature. (6) With further technical development, metal matrix composites, especially short fiber composites, may be used in specialty applications, particularly in energy conversion systems. (7) Areas of application of advanced composites that could result in significant secondary impacts are automotive equipment, general and commercial aviation, agriculture, and the industrialization of space, and (8) advanced composites can be a major tool for petroleum energy conservation, especially in transportation. GRA

N79-11998 European Space Agency, Paris (France).
CONTRIBUTION OF HIGH-VOLTAGE ELECTRON MICROSCOPY TO THE STUDY AND IMPROVEMENT OF REFRACTORY COMPOSITES
Jean-Francois Stohr (ONERA) *In its* La Rech. Aerospatiale, Bi-monthly Bull. No. 1978-1 (ESA-TT-491) Aug. 1978 p 31-62 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1978-1, Jan.-Feb. 1978 p 13-24 Original report in FRENCH previously announced as A78-32036 (For primary document see N79-11996 03-01)
HC A06/MF A01

N79-12001 European Space Agency, Paris (France).
CREEP PREDICTION OF DIRECTIONALLY SOLIDIFIED COTAC 74 COMPOSITE
Tasadduq Khan (ONERA) *In its* La Rech. Aerospatiale, Bi-monthly Bull. No. 1978-1 (ESA-TT-491) Aug. 1978 p 113-121 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1978-1, Jan.-Feb. 1978 p 49-52 Original report in FRENCH previously announced as A78-32038 (For primary document see N79-11996 03-01)
HC A06/MF A01

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics*.

N79-12165 Illinois Univ. at Urbana-Champaign, Urbana.
TRANSIENT ROTATIONAL RELAXATION STUDIES AND FOURIER TRANSFORM MICROWAVE SPECTROSCOPY Ph.D. Thesis
William Eugene Hoke 1978 145 p
Avail: Univ. Microfilms Order No. 7820965

Transient microwave experiments are employed in rotational relaxation studies and Fourier transform spectroscopy. T sub 1 and T sub 2 relaxation times transient techniques in A are measured by transient techniques in OCS and NH3 systems. For OCS T1 = T2 whereas 1 less than or equal to T sub 2/T sub 1 less than or equal to 2 in NH3. The NH3 results are successfully interpreted using Anderson impact theory. Transient techniques are also employed in a microwave Fourier transform spectrometer. The instrument is shown to have advantages in sensitivity and resolution over steady-state methods.
Dissert. Abstr.

N79-12166 Hawaii Univ., Honolulu.
NUCLEAR MAGNETIC RESONANCE STUDIES IN LIQUID CRYSTAL SOLVENTS Ph.D. Thesis
Narayana Swamy Balakrishnan 1978 179 p

Avail: Univ. Microfilms Order No. 7820422

Results of anisotropic NMR spectral investigations of thiazole and monodeuterated thiazoles, 2,5-dibromothiophene, N, N-dimethylformamide, and N,N-dimethylformamide-d are presented. The NMR spectrum of thiazole oriented in a nematic phase was studied. Since the PMR spectrum of oriented systems are usually dominated by the dipolar couplings, a system of three nonequivalent protons without symmetry provided only two equations for the three unknowns (three dipolar coupling). The use of deuterium substitution to augment the number of available equations in these under-determined systems was explored. It was shown that the synthesis of 2d-thiazole and 5d-thiazole followed by a determination of their anisotropic spectra can aid in the spectra analysis of thiazole A combination of the three dipolar couplings from the results of this study with the microwave structural data of thiazole enabled a determination of the elements of the order matrix. Dissert. Abstr.

N79-12167 Cincinnati Univ., Ohio.
STUDY OF THE SPECIFIC ADSORPTION OF ANIONS ON A MERCURY COATED PLATINUM OPTICALLY TRANSPARENT ELECTRODE BY TRANSMISSION SPECTROELECTROCHEMISTRY Ph.D. Thesis
John Frederick Goelz 1978 104 p
Avail: Univ. Microfilms Order No. 7821568

Transmission Spectroelectrochemistry was utilized to study the specific adsorption of anions on a mercury coated platinum Optically Transparent Electrode (Hg-Pt OTE). Double potential step experiments performed while passing 525 nm light through a Hg-Pt OTE in contact with aqueous solutions of NaF, NaBr, $NaNO_3$, Na_2CO_3, CH_3COONa, NaCl, or Na_2SO_4 produced optical signals whose magnitude correlates with the known sequence of specific adsorption of anions on mercury. The relative slowness of the adsorption process (over the desorption process) was used to translate the magnitude of the optical signal into units of surface quantity. The slope of a plot of absorbance versus square-root of time provides a 'molar absorptivity' (or the effect of the adsorbing species on the optical constants of the electrode) which when used with a modified Beers' Law relationship can give surface excess. Dissert. Abstr.

N79-12168 Purdue Univ., Lafayette, Ind.
EVALUATION OF IMAGING DETECTORS COUPLED TO AN ECHELLE GRATING SPECTROMETER FOR ATOMIC SPECTROSCOPY Ph.D. Thesis
Hugo Linnius Felkel, Jr. 1978 257 p
Avail: Univ. Microfilms Order No. 7821443

A silicon target vidicon and an image dissector were coupled to an echelle grating spectrometer for simultaneous multielement determinations by atomic absorption or atomic emission spectroscopy. The design considerations for the instrumentation developed for a vidicon and an image dissector are presented here. Because the echelle grating spectrometer and the imaging detectors are not commonly used in analytical laboratories, the basic concepts and characteristics of these components are discussed. The parameters affecting the random access signal and detector linearity for a silicon target vidicon suggests that the linear dynamic range is determined by the time spent priming the target prior to random access interrogation. Dissert. Abstr.

N79-12169 Arizona Univ., Tucson.
CHROMATOGRAPHIC CHARACTERIZATION OF POLYMERIC ADSORBENTS Ph.D. Thesis
Larry Dean Butler 1978 259 p
Avail: Univ. Microfilms Order No. 7821916

A systematic chromatographic method was developed for characterizing and evaluating adsorbents. This characterization method was applied to a variety of commercially available porous polymeric adsorbents and to Carbosieve-B, a carbon adsorbent. Peak position (retention) and peak broadening (efficiency) for several organic adsorbates were shown to be dependent on the chemical and physical nature of the adsorbent, as well as the chemical nature of the adsorbate. In general, the adsorbents with high surface areas had the greatest retention efficiencies, and sampling capacities, but no one adsorbent will be best for every application. The thermal stabilities of the adsorbents were shown to be dependent on their chemical compositions.
Dissert. Abstr.

N79-12170 Illinois Univ. at Urbana-Champaign, Urbana.
MICROPROCESSORS IN ANALYTICAL CHEMISTRY: APPLICATIONS TO ANALYTICAL SPECTROMETRY Ph.D. Thesis
James Paul Avery 1978 381 p
Avail: Univ. Microfilms Order No. 7820894

An initial exploration of the analytical utility of microprocessors is documented. Some general concepts pertaining to the use of microprocessors in analytical instrumentation are developed, particularly with respect to classifying the types of roles that microprocessors can fill. These concepts are illustrated in the atomic emission and UV/visible spectrometers developed as part of this work. The system is designed specifically for investigating and developing microprocessor-based instrumentation. Three systems were designed to demonstrate the utility and versatility of microprocessors in analytical applications. These systems are: a versatile data acquisition module, which operates as a simple, programmable device; a monochromator controller of intermediate complexity and significant capability; and a supervisory system which integrates a third microprocessor together with the first two units to form a hierarchical system for controlling a spectrometric system. Dissert. Abstr.

N79-12171 Virginia Polytechnic Inst. and State Univ., Blacksburg.
SELECTIVITY AND TEMPERATURE EFFECTS IN HIGH PERFORMANCE LIQUID CHROMATOGRAPHY Ph.D. Thesis
David Anthony Colby 1978 112 p
Avail: Univ. Microfilms Order No. 7820354

A study of six liquid chromatographic column packing materials was conducted. The materials investigated were: SI-60, SI-100, ALOX T, RP-2, RP-8, and RP-18. The column packing materials had an average particle diameter of 10 microns and were slurry packed into stainless steel columns that were 3 mm i.d. and 250 mm in length. Two series of probe compounds were utilized to investigate the differences in selectivity exhibited by the column packing materials in the normal phase mode and in the reversed phase mode. A column oven which controlled temperature to within + or - 0.2 C over the range of 0 C to 100 C was utilized throughout the work. Four different mobile phases were used, two for the normal phase work and two for the reversed phase work. The effect of temperature was investigated in both the normal phase mode (20 C - 50 C) and in the reversed phase mode (20 C - 80 C). Dissert. Abstr.

N79-12172 Yale Univ., New Haven, Conn.
AXIAL DISPERSION IN LIQUID CHROMATOGRAPHY Ph.D. Thesis
Hung-Jye Frederick Lin 1978 93 p
Avail: Univ. Microfilms Order No. 7820161

The effect of viscous dissipation on column efficiency in liquid chromatography with microparticulate packed columns was investigated. A theoretical model was developed to describe the interplay of secondary equilibria, which gives rise to different forms of an eluting species, with the actual chromatographic process. The effect of this phenomena on retention and band spreading is illustrated and experimental results obtained with aromatic carboxylic acids in reversed phase chromatography are presented. It is shown that a relatively slow kinetics of secondary equilibria gives rise to asymmetric peaks and impairs chromatographic resolution. A method for deconvoluting overlapping peaks is introduced by a nonlinear regressional curve fitting technique. It is applicable when the individual chromatographic peaks can be represented by Gamma distribution function. This method was used to deconvolute experimental chromatograms and to evaluate the first three statistical moments of the individual peaks. Dissert. Abstr.

N79-12173 Ohio State Univ., Columbus.
AN INVESTIGATION OF THE MECHANISM OF FLAME QUENCHING Ph.D. Thesis
Om Parkash Dhiman 1978 142 p
Avail: Univ. Microfilms Order No. 7819578

The attenuation and quenching of laminar flames of methane-air, methane-oxygen, acetylene-air, hydrogen-air, hydrogen-oxygen-helium, hydrogen-oxygen-argon, hydrogen-oxygen-nitrogen, and hydrogen-oxygen-carbon dioxide mixtures were studied. The flames were quenched by squeezing them between

two movable plates. Critical flows for flash-back and blow-off in the rectangular burner were measured and compared with those obtained with a circular burner. The quenching distance was measured for flames of various fuel oxidizer mixtures at three different gas speeds and Reynolds numbers. Flame temperatures, coefficients of thermal conductivity, heat capacities, and diffusion coefficients were calculated to determine their effect on quenching distance. A simplified one-dimensional mathematical model of the flame was used to develop a theoretical equation for quenching distance. Dissert. Abstr.

N79-12174 Purdue Univ., Lafayette, Ind.
CHARACTERISTIC TIME MODEL FOR FLAME STABILIZATION IN SIMPLIFIED CONTINUOUS SYSTEMS Ph.D. Thesis
Steven Leonard Plee 1978 142 p
Avail: Univ. Microfilms Order No. 7821488

Problems of flame stabilization associated with both conventional and advanced prevaporizing/premixing continuous combustors are examined for three different bluff body stabilized flames. A semiempirical characteristic time approach is considered. Characteristic times associated with turbulent mixing, homogeneous chemical kinetics, liquid droplet evaporation and fuel injection are quantified for lean blowoff. In addition to correlating variations in combustor pressure, inlet temperature and air velocity, the model also includes the influence of flameholder geometry, fuel type and injector size. The developed characteristic time model for bluff body flame stabilization is extended to conventional gas turbine combustors. Limited blowoff data from a T 63 and GT-309 burner are correlated via the characteristic time approach. Dissert. Abstr.

N79-12175 Stevens Inst. of Tech., Hoboken, N. J.
THE EFFECT OF DROP SIZE NITRIC OXIDE GENERATION IN THE TURBULENT, PREMIXED SPRAY COMBUSTION OF LIQUID HYDROCARBONS Ph.D. Thesis
Tadeusz Jan Rychter 1977 211 p
Avail: Univ. Microfilms Order No. 7821632

The combustion system considered involved turbulent flame propagation through a fuel-lean, premixed, heterogeneous, hydrocarbon-air mixture. This type of flame was chosen because it occurs in many practical combustion devices. A theoretical model to calculate NO concentration profiles across a flame zone was developed. The model takes into account the fuel spray droplet size distribution, the fuel-air mixture ratio, inlet temperatures, turbulence intensity level, heat losses from the flame and physical and chemical properties of the reactants. The model couples the turbulent flame structure calculations with chemical kinetics of NO formation. Dissert. Abstr.

N79-12176 Clemson Univ., S.C.
A THERMODYNAMIC STUDY OF POLYMER-SOLVENT AND POLYMER-POLYMER INTERACTIONS USING GAS-LIQUID PARTITION CHROMATOGRAPHY Ph.D. Thesis
Kyoo Yung Song 1978 147 p
Avail: Univ. Microfilms Order No. 7821545

Interaction parameters between solvent (benzene, toluene, n-heptane, carbon tetrachloride) and polymer (polythylene glycol) (PEG), polypropylene glycol (PPG) at 70 to 110 C, between each solvent and polyvinyl acetate (PVAc) at 100 to 130 C were determined by using a gas chromatographic technique. Interaction parameters for the polymer system PEG-PPG between 70 and 100 C and for the system PEG-PVAc between 100 and 110 C were determined using the same technique.
Dissert. Abstr.

N79-12177 Michigan Univ., Ann Arbor.
ISOTOPIC OXYGEN EXCHANGE ON SUPPORTED METAL AND BIMETAL CATALYSTS Ph.D. Thesis
Ahmad Essa Beshareh 1978 192 p
Avail: Univ. Microfilms Order No. 7822859

Mathematical solutions to three kinetic routes were developed to describe homogeneous exchange, heterogeneous exchange for equivalently exchangeable and non-equivalently exchangeable solid-phase oxygen. Bases of applicability of these solutions were outlined, and the experimental procedures pertinent to the use of the isotopic oxygen exchange for reaction studies were detailed. Four supported metal and bimetal catalytic systems were studied in detail. The kinetic formulations and the various applications clearly demonstrated the potential of the isotopic oxygen exchange reaction as a tool in the catalytic research.
Dissert. Abstr.

N79-12178*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ENHANCED HYDROPHILICITY OF CHLORIDED ALUMINUM OXIDE PARTICULATES
Wesley R. Cofer, III Nov. 1978 28 p refs
(NASA-TP-1312; L-12265) Avail: NTIS HC A02/MF A01 CSCL 07D

An enhancement of hydrophilicity for chlorided aluminas was demonstrated by the results obtained from gaseous H2O sorptions at 70-, 80-, and 86-percent relative humidity on alpha and gamma aluminum oxide particulates and on alpha and gamma aluminum oxide particulates with a chemisorbed surface chloride phase (produced by reactions of gaseous HCl + H2O on alumina). Continuous sorption histories for H2O on chlorided aluminas having specific surface areas that range from 7 to 227 sq m/g before chloriding indicated that initial sorption rates were directly linked to the extent of chemisorbed chlorided coverage and implied the same relationship for sorption capacities. The initial sorption rate on chlorided aluminas was found to be slower for the first exposure to H2O than for subsequent exposures (which reached equilibrated H2O coverages much faster), suggesting that slow chemical reactions between H2O and chlorided alumina may have been operative during initial exposures. Chlorided alumina particles were found to remain very hydrophilic (relative to nonchlorided analogs) for several H2O sorption/desorption cycles. Author

N79-12179*# National Aeronautics and Space Administration, Washington, D. C.
ACID-BASE TITRATIONS FOR POLYACIDS: SIGNIFICANCE OF THE pK SUB a AND PARAMETERS IN THE KERN EQUATION
L. Meites Nov. 1978 11 p Transl. into ENGLISH from Nuova Chim. (Italy), v. 48, no. 10, 1972 p 99-102 Transl. by Sci. Transl. Serv., Santa Barbara, Calif. Original doc. prep. by Clarkson Coll. of Technol., Potsdam, N. Y.
(Contract NASw-3198)
(NASA-TM-75359) Avail: NTIS HC A02/MF A01 CSCL 07D

A new method is suggested for calculating the dissociation constants of polyvalent acids, especially polymeric acids. In qualitative form the most significant characteristics of the titration curves are demonstrated and identified which are obtained when titrating the solutions of such acids with a standard base potentiometrically. Author

N79-12180*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CATALYST SURFACES FOR THE CHROMOUS/CHROMIC REDOX COUPLE Patent Application
Jose D. Giner (Giner, Inc., Waltham, Mass.) and Kathleen J. Cahill, inventors (to NASA) (Giner, Inc., Waltham, Mass.) Filed 29 Nov. 1978 16 p Sponsored by NASA
(NASA-Case-LEW-13148-1; US-Patent-Appl-SN-964754) Avail: NTIS HC A02/MF A01 CSCL 07D

An electricity producing cell of the reduction oxidation (REDOX) type is described. The cell comprises a container divided into anode and cathode compartments respectively, by an ion permeable membrane. An anode fluid is directed through a compartment from a source while a cathode fluid is directed through a different compartment from a different source. These fluids are aqueous HCl solutions each containing a different metallic chloride salt. In an exemplary cell the anode fluid contains chromium chloride while the cathode fluid contains iron chloride. Circulation of the anode and cathode fluids produces a difference of potential between inert, electrically conductive electrodes. NASA

N79-12181# New Orleans Univ., La.
ANALYSIS BY FLAMELESS ATOMIC ABSORPTION Final Report, 1 Jun. 1975 - 31 Aug. 1977
Donald G. Davis May 1978 77 p refs
(Contract DAMD17-75-C-5048; DA Proj. 3A7-62720-A-835) (AD-A058091) Avail: NTIS HC A05/MF A01 CSCL 07/4

The wire loop can be successfully used as an electrothermal atomizer for flameless atomic absorption spectroscopy and is competitive with carbon rod and carbon cup atomizers. The wire loop is slightly less sensitive than carbon atomizers but is much simpler and cheaper to operate. Although for some samples the wire loop is not as prone to matrix effects as carbon atomizers, these effects must be considered. The method of standard additions was shown to be successful in reducing or eliminating matrix problems. The wire loop method was tested against EPA standard water samples and Army natural water samples. The Army samples were natural waters that had been previously analyzed by other atomic absorption methods. Data from these tests indicate that the wire loop methods have a standard deviation of less than 5% and an accuracy acceptable for water quality analysis. GRA

N79-12182# Naval Weapons Center, China Lake, Calif.
CRITICAL INJECTION VELOCITIES FOR IGNITION
G. F. Kinney and R. G. S. Sewell Jun. 1978 24 p
(AD-A057748; NWC-TP-6038) Avail: NTIS HC A02/MF A01 CSCL 21/2

Forcible injection of combustible material into a closed volume of air can increase its temperature substantially either by molecular impaction on a blunt face of an object or by its kinetic energy loss on sudden deceleration. Injection velocities required to produce ignition temperatures by each mechanism have been computed for a variety of combustible and explosive materials. The two diverse methods of computation are in rough agreement, with representative velocities for ignition being perhaps 1,000 m/s or somewhat less, corresponding to Mach numbers of about 2 1/2. Injection velocities required for the prompt initiation of the explosion of an explosive fuel are rather comparable, and delayed initiation can occur with somewhat lesser velocities. Calculations are all speculative in nature, but they provide a solid basis for comparison of fuels and for subsequent refinement by data from experimental results.
Author (GRA)

N79-12183# New Mexico Univ., Albuquerque. Eric H. Wang Civil Engineering Research Facility.
DEVELOPMENT OF HIGH-PRESSURE LIQUID CHROMATOGRAPHIC TECHNIQUES, PHASE 2 Final Report, Jul. 1976 - Sep. 1977
James R. Matthews and Glenn D. Pierce Apr. 1978 83 p refs
(Contract F29601-76-C-0015; AF Proj. 2103)
(AD-A058243; CEEDO-TR-78-1) Avail: NTIS HC A05/MF A01 CSCL 13/2

The Organics-Carbon Adsorbable minifilter procedure was used to recover refractory organics from treated wastewater. Ten carbon chloroform extracts were recovered with this procedure. A parallel run using pulsed versus nonpulsed carbon beds was made to compare the recovery efficiencies of the beds. Five parallel runs were made to compare the ability of activated carbon and XAD-2 macroreticular resin to concentrate trace organics. An improved recovery system was developed and evaluated; this system recovered a greater organic mass per gram of carbon and per unit volume of sample than the Organics-Carbon Adsorbable minifilter and gave measurable recoveries in 24 hours. GRA

N79-12184# Pennsylvania State Univ., University Park. Applied Research Lab.
FIRST PRINCIPLES PSEUDOPOTENTIAL CALCULATIONS OF ELECTRONIC AND ATOMIC PROPERTIES OF SOLID AND LIQUID ALKALI METALS Ph.D. Thesis
Richard S. Day 10 Jul. 1978 119 p refs
(Contract N00017-73-C-1418)
(AD-A058828; ARL-PSU-TM-78-194) Avail: NTIS HC A06/MF A01 CSCL 07/2

First principles fully nonlocal pseudopotentials are constructed for the alkali metals Li, Na, and K. The orthogonalization hole contribution to the pseudopotential is treated exactly and comparison with approximate treatments show significant differences. The pseudopotentials are used to calculate various solid and liquid properties of these alkalis. The phonon spectra and elastic shear constants are calculated for the solid metal and are in good agreement with experiment. They are generally within 20% of experiment and in some cases much better agreement is obtained. The liquid structure factor curve, S(q), is calculated using a Monte Carlo technique and the agreement with experiment is excellent. Electrical resistivities of the liquid alkali metals are also calculated using the pseudopotential and computed liquid structure. The electronic transport properties are calculated for the first time, using the same ion potential to determine the theoretical liquid structure and to describe the electron scattering potential in the solid. The results are in reasonable agreement with experiment considering the first principles nature of the calculation. Finally, a pseudo-atom model is suggested as a more appropriate means of describing the core-electron states used in constructing the pseudopotential.
Author (GRA)

N79-12185# Purdue Univ., Lafayette, Ind. Project Squid Headquarters.
EXPERIMENTAL AND THEORETICAL STUDIES OF CHEMICAL DYNAMICS AND INSTABILITIES IN IRREVERSIBLE PROCESSES Final Report, 1 Oct. 1967 - 31 Dec. 1977
John Ross (MIT) Aug. 1978 20 p refs
(Contract N00014-75-C-1143)
(AD-A058855; SQUID-MIT-90-PU) Avail: NTIS HC A02/MF A01 CSCL 21/2

The final report summarizes the work accomplished under the subcontract. The overall objectives for the investigation were as follows: The determination of molecular properties of chemical dynamics for reactions of importance to combustion and propulsion. Molecular beam techniques were used for the experimental part of this work and were accompanied by theoretical studies in chemical dynamics. The second purpose was the study of the interaction of chemical reactions with transport processes and flows in gases in which instabilities may occur. Author (GRA)

N79-12186# California Univ., Livermore. Lawrence Livermore Lab.
DEVELOPMENT OF ADVANCED CONCEPTS FOR IMPROVED HEAVY WATER TECHNOLOGY
F. T. Aldridge, I. P. Herman, J. B. Marling, and L. L. Wood Apr. 1978 31 p refs
(Contract W-7405-eng-48)
(UCID-17736-78-1) Avail: NTIS HC A03/MF A01

Three significantly different advanced heavy water production technology processes continued. Two optimum reagents were selected for the process based on infrared laser multiphoton dissociation of organic molecules. A preliminary chemical engineering evaluation of this process indicates relatively high gas pumping costs in a process operating at low pressures (e.g., 10 to 100 torr). The required lasers and gas chromatograph are now operational to support evaluation of the process based on gas-phase deuterium halide addition into olefins. The CaNi5 alloy for chromatographic separation of hydrogen isotopes also continued. DOE

N79-12187# European Space Agency, Paris (France).
MEASUREMENT OF SMALL CONCENTRATIONS OF POLLUTANTS IN GASES BY AN OPTICAL AC WAVELENGTH SCANNING METHOD
S. Kelm and H. Eberius Aug. 1978 104 p refs Transl. into ENGLISH of 'Ein opt. Modulationsverfahren zur Messung sehr kleiner Schadstoffkonzentrationen in gasen', DFVLR, Stuttgart Report DLR-IB-453-78/1, Jan. 1978 Original report in GERMAN previously announced as N78-29196
(ESA-TT-489; DLR-IB-453-78/1) Avail: NTIS HC A06/MF A01

An optical scanning method, based on absorption derivative spectroscopy, by which very small concentrations of pollutants, e.g., NO, NH3 in gases, can be measured is described. Under different experimental conditions the theoretical and practical limits of the method were determined by an extensive analysis of different noise sources. Characteristic quantities for the optimization of the method are presented. The optical scanning method was applied for the analysis of combustion gases of hydrocarbonair flames. Author (ESA)

N79-12188# National Technical Information Service, Springfield, Va.

ELECTROCHEMICAL METHODS OF CHEMICAL ANALYSIS, VOLUME 2. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1976 - Aug. 1978
Diane M. Cavagnaro Sep. 1978 142 p Supersedes NTIS/PS-77/0870; NTIS/PS-76/0762; NTIS/PS-75/627 (NTIS/PS-78/0966/8; NTIS/PS-77/0870; NTIS/PS-76/0762; NTIS/PS-75/627) Avail: NTIS HC $28.00/MF $28.00 CSCL 07D

Polarographic, potentiometric, voltametric, and coulometric techniques are covered, including electrochemical titrations. Studies on ion selective electrodes are excluded. GRA

N79-12189# Missouri Univ. - Columbia. Dept. of Civil Engineering.
THERMAL REGENERATION OF ACTIVATED CARBON
Louis Hemphill May 1978 116 p refs
(Grant EPA-S-800554)
(PB-284065/0; EPA-600/2-78-103) Avail: NTIS HC A06/MF A01 CSCL 07A

The project included an experimental pilot plant thermal regeneration study to determine specific thermal regeneration characteristics of selected petrochemical waste materials and a low-pressure thermal investigation. Results of these studies showed: (1) small polar molecular species, or species highly soluble in water, are resistant to carbon sorption, (2) extreme acidic or basic waste streams may require pH adjustment to promote carbon sorption, (3) batch isotherm values provide basic information relative to activated carbon-petrochemical waste column design, (4) vacuum regeneration of petrochemical saturated activated carbon is effective and efficient, with most sorbent-sorbate combinations tested, the carbon sorbent could be regenerated to 95% of original sorption capacity, (5) temperature required for carbon regeneration was a function of waste type (composition) and sorption capacity. The report describes experimental methods of differential thermal analysis, vacuum thermal regeneration, isotherm and column derived sorption values, and quantitative relationships of temperature and thermal regeneration response. GRA

N79-12190# United Technologies Research Center, East Hartford, Conn.
INVESTIGATION OF SATURATED LASER FLUORESCENCE AND CARS SPECTROSCOPIC TECHNIQUES FOR COMBUSTION DIAGNOSTICS Final Report, Oct. 1976 - Jan. 1978
A. C. Eckbreth, P. A. Bonczyk, and J. A. Shirley Jun. 1978 156 p refs
(Contract EPA-68-02-2176)
(PB-283819/1; EPA-600/7-78-104) Avail: NTIS HC A08/MF A01 CSCL 07D

Saturated laser-excited molecular fluorescence measurements of CH and CN in atmospheric pressure acetylene flames were compared with absorption measurements of these flame radicals. It was found possible to saturate the fluorescence intensity of both radicals with readily achieved levels of laser spectral intensity (100,000 to 1 million watts per square centimeter-reciprocal centimeter). Coherent Anti-Stokes Raman Spectroscopy (CARS) thermometry investigations were conducted on flame nitrogen in a variety of flames, including highly sooting propane diffusion flames. CARS species sensitivity was addressed in a study of CO detectability. GRA

N79-12374# Dornier-System G.m.b.H., Friedrichshafen (West Germany).
SEPARATION POWER DENSITY OF GAS DYNAMICAL ISOTOPE SEPARATION PROCEDURES FOR THE ENRICHMENT OF U-235 IN THE PRESENCE OF LIGHT ADDITIVE GASES [DIE TRENNLEISTUNGSDICHTE VON GASDYNAMISCHEN ISOTOPENTRENNVERFAHREN ZUR ANREICHERUNG VON U-235 IN GEGENWART VON LEICHTEN ZUSATZGASEN]
Wilmar Fuhse *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 59-63 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)
Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95.40

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N79-12191 Purdue Univ., Lafayette, Ind.
STUDIES OF CLEAN AND REACTED METAL SURFACES BY X-RAY PHOTOELECTRON SPECTROSCOPY AND SECONDARY ION MASS SPECTROMETRY Ph.D. Thesis
Richard Wayne Hewitt 1978 198 p
Avail: Univ. Microfilms Order No. 7821456

X-ray photoelectron spectroscopy and secondary ion mass spectroscopy were combined in the same ultrahigh vacuum system to facilitate a new approach to studying clean and reacted surfaces. Each technique was housed in a satellite vacuum chamber, and was interconnected with a set of magnetically-driven, UHV-compatible sample transfer devices. This design philosophy was conducive to efficient use of the instrument in a multiple user environment. The advantages and capabilities of this approach are discussed with respect to its flexibility and its ability to couple to other surface techniques. In order to gain insight into the effects of the interaction of charged particles with surfaces, the phenomenon of preferential sputtering in Pd-Ag alloys was investigated. Bombardment of a 30% Pd-70% Ag alloy with 400 eV positive ion beams of the noble gases He, Ne, Ar, Kr and Xe resulted in changes in surface composition of up to 12%, depending upon the mass of the primary ion. Dissert. Abstr.

N79-12192 Ohio State Univ., Columbus.
THE EFFECTS OF NON-ISOTHERMAL HEATING DURING TENSILE AND DIFFERENTIAL TENSILE TESTING OF TYPE 310 STAINLESS STEEL, POLYCRYSTALLINE NICKEL, AND SINGLE CRYSTAL NIOBIUM Ph.D. Thesis
Allan Paul Katz 1978 147 p
Avail: Univ. Microfilms Order No. 7819618

Stress and elongation values, measured in tensile tests conducted in air, differed little from those in water for all three materials. At low temperature, however, significant differences in both stress and elongation were observed, particularly for stainless steel. In argon, flow stress values progressively dropped from their isothermal values as temperature rose during the test. In addition, tensile strength and elongation values decreased with increased heating in argon. The results of the differential tests conduced in air and water showed little differences for all three materials. No effects of non-isothermal heating were observed. Dissert. Abstr.

N79-12193 Stevens Inst. of Tech., Hoboken, N. J.
MICROVOID FORMATION AND GROWTH IN THIN EVAPORATED GOLD FILMS Ph.D. Thesis
James Robert Lloyd 1978 168 p
Avail: Univ. Microfilms Order No. 7821623

Small voids (less than 50 A in diameter) present in high densities in thin gold films were studied by transmission electron microscopy. The voids were studied as a function of substrate temperature, deposition rate, residual gas pressure, and the substrate material (halide salt crystal, polycrystalline metal, amorphous glass). The void density was quite sensitive to the deposition rate and the substrate temperature, but only slightly affected by variations in the residual gas pressure and the nature of the substrate material. Void growth, observed following post-deposition treatments (room temperature aging and high-current-density powering), was compared with known thin film resistivity decay. It was concluded that the voids grow by the absorption of vacancies quenched in during film formation. A theoretical model was developed assuming vacancy annihilation at film surfaces and at voids. Dissert. Abstr.

N79-12194 Illinois Univ. at Urbana-Champaign, Urbana.
PRECIPITATION AND ORDERING IN THE NIOBIUM HYDROGEN SYSTEM Ph.D. Thesis
Bruce James Makenas 1978 165 p
Avail: Univ. Microfilms Order No. 7820996

An experimental study, using Transmission Electron Microscopy techniques was carried out to observe precipitation and ordering phenomena in the Niobium-Hydrogen system.

Niobium-Hydrogen alloys of composition H/Nb = 0.001 to H/Nb = 1.07 were prepared by improved hydrogen charging methods. Room temperature, hot stage, and cold stage experiments were performed in situ in the electron microscopy. The plastic deformation, which accompanies the precipitation and dissolution of hydrides, was observed. Volume constraint, temperature gradients, and impurity traps were shown to have an effect on the nucleation of hydrides. Several low temperature ordered phases zeta, epsilon, and lambda were studied using electron diffraction. The crystal structures were observed to change with both temperature and composition. The NbH2, delta-phase was also studied and shown to consist of a highly twinned fcc structure. Dissert. Abstr.

N79-12195 Cincinnati Univ., Ohio.
EFFECTS OF ISOTHERMAL FORGING CONDITIONS ON THE PROPERTIES AND MICROSTRUCTURES OF Ti-10V-2Fe-3Al Ph.D. Thesis
Ivan Antonio Martorell 1978 215 p
Avail: Univ. Microfilms Order No. 7821578

Ring specimens with two different grain sizes were forged isothermally on a hydraulic press at two different speeds and then quenched in water to retain the as-forged structure. The resulting microstructures were determined using a light microscope and a transmission electron microscopy. The room temperature mechanical properties (tensile properties, fracture toughness, W/A, and hardness) resulting from forging at selected conditions were also determined. The stress-strain curves were determined, using the ring compression test. If the flow stress (forging conditions) is known, the room temperature mechanical properties (tensile, fracture toughness, W/A) may be closely estimated. A long-term relation is shown to exist between room temperature Rockwell C hardness and flow stress and room temperature properties, which could also be used for a rough estimate of the properties of the as-forged material. Dissert. Abstr.

N79-12196 Ohio State Univ., Columbus.
A STUDY OF STRESS CORROSION CRACKING OF TYPE 304 STAINLESS STEEL, INCOLOY 800 ALLOY, AND INCONEL 600 ALLOY IN BOILING NaOH SOLUTIONS Ph.D. Thesis
Yong Soo Park 1978 278 p
Avail: Univ. Microfilms Order No. 7819646

Fast straining tests and slow straining tests were conducted to study caustic cracking of Fe-Cr-Ni alloys. The fast straining tests were used to evaluate the stress corrosion cracking susceptibility of type 304 stainless steel in boiling 20N NaOH solution, and of Inconel 600 alloy and Incoloy 800 alloy in boiling 17.5N NaOH solution. The initial strain rates were 22.5 percent, 56.2 percent, and 112.5 percent min. The crack propagation rate estimated from the straining experiments correlated well with the previous constant load experiments. It was found that the fast straining technique is a useful method for estimating, through short term experiments, parameters like crack propagation rate, crack morphology, and repassivation rate, as a function of the electrode potential. The crack propagation rate varied with potential. The maximum rate for an alloy was calculated in the secondary passive region and the minimum in the passive region. Dissert. Abstr.

N79-12197 Stevens Inst. of Tech., Hoboken, N. J.
RELATIONSHIPS BETWEEN STRUCTURE, ELECTRODE POTENTIALS AND INTERNAL STRESS DURING EARLY STAGES OF NICKEL ELECTRODEPOSITION Ph.D. Thesis
Haim Feigenbaum 1978 175 p
Avail: Univ. Microfilms Order No. 7821615

The relationship between internal stress and thickness during early stages of epitaxial nickel electrocrystallization was determined and related to the structure. The structure of the electrodeposits at various stages of their crystallization process was examined electron microscopically. The variables which were investigated were the copper substrate, plating-bath additives and the interruption and resumption of plating at several deposit thicknesses. The bath additives were saccharin and phenosafranine. The stresses were calculated from changes in the force exerted by an electrobalance to keep the substrate, plated on one side only, from bending. The nucleation of three-dimensional crystallites was indicated by a peak in the electrode potential and a higher subsequent dislocation density. Dissert. Abstr.

N79-12198 Illinois Univ. at Urbana-Champaign, Urbana.
CHARACTERIZATION OF DUCTILE FRACTURE IN WROUGHT STEELS AND WELDMENTS Ph.D. Thesis
Edward Paul Cox 1978 103 p
Avail: Univ. Microfilms Order No. 7820919

Collapse stresses of flawed structural steels were predicted by a two failure criterion model based on plasticity limit load theory and linear elastic fracture mechanics. The fracture behavior of wrought steel specimens could be characterized by either the limit load or fracture toughness failure criterion. The controlling failure criterion depended on the tensile strength (Su), fracture toughness (Kc), and section size (W); or more explicitly, on the magnitude of Kc/Su square root of W. The boundary separating the two failure criteria was dependent on geometry and crack length. The two failure criteria model was extended to characterize the fracture behavior of A514F/E110 structural steel weldments containing incomplete joint penetration discontinuities. Dissert. Abstr.

N79-12199 American Univ., Washington, D. C.
AN INVESTIGATION OF THE INHIBITION OF CORROSION OF HIGH-STRENGTH ALUMINUM ALLOY 2024 T-3 IN AGGRESSIVE AQUEOUS SOLUTIONS Ph.D. Thesis
Bennie Will Samuels 1978 120 p
Avail: Univ. Microfilms Order No. 7823660

Various inorganic and organic compounds were studied for retarding the rate of corrosion of aluminum alloy 2024 T-3 in aerated 0.1N NaCl solutions at room temperature. The complex-ion theory of corrosion was used to elucidate mechanisms for the actions of these compounds by describing the chemical species involved in the corrosion inhibition process. The inorganic compounds were the sodium salt of the following acids: chromic, nitric, perchloric and sulfuric. The organic compounds studied were azelaic, quinaldic and rubeanic acids, benzotriazole, cupferron, oxamide, and the sodium salt of acetic, benzoic, citric, oxalic and tartaric acids. In accordance with Faraday's law, the weight-loss data from immersion studies were used to determine corrosion rates, current densities and inhibition efficiencies for the compounds studied. Dissert. Abstr.

N79-12200 California Univ., Davis.
EQUATION OF STATE AND TRANSPORT MEASUREMENTS ON EXPANDED LIQUID METALS UP TO 8000 DEG K AND 0.4 GPa Ph.D. Thesis
William Mark Hodgson 1978 219 p
Avail: Univ. Microfilms Order No. 7822651

Equilibrium measurements of pressure, enthalpy, density, temperature, and resistivity were made on liquid lead, platinum, gold-copper, uranium, niobium, and niobium-hafnium at high temperatures and pressures. A unique method of determining sample temperatures from multichannel fast radiation pyrometry was developed and used to calculate temperatures between 1600 and 6000 K without definitive emissivity information. Pseudopotential theory was used to model the lead resistivity and equation of state measurements and t-matrix theory was applied to the uranium resistivity data. The central experimental concept involved resistively heating an uncontained 1 mm diameter wire sample at a rate slow enough to allow uniform energy deposition and pressure equilibration, but fast enough to avoid significant heat loss and sample collapse through gravitational or instability effects. Dissert. Abstr.

N79-12201*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE EFFECT OF NITROGEN ION (N(+)) IMPLANTATION ON THE FRICTION AND WEAR CHARACTERISTICS OF IRON
William R. Jones, Jr. and John Ferrante Nov. 1978 18 p refs
(NASA-TM-79029; E-9824) Avail: NTIS HC A02/MF A01 CSCL 11F

The friction and wear properties of pure iron sliding against M-50 steel were not significantly altered after nitrogen implantation. The unimplanted iron exhibited an average wear rate of 1.47 + or - 0.27 M to the third power/N-M compared to

1.53 + or - 0.73 for the nitrogen implanted iron. Average friction coefficients were 0.10 (unimplanted) and 0.09 (implanted). G.G.

N79-12202*# Carnegie-Mellon Inst. of Research, Pittsburgh, Pa.

EVALUATION OF THE MECHANICAL PROPERTIES OF ELECTROSLAG REFINED Fe-12Ni ALLOYS

G. K. Bhat Apr. 1978 70 p refs

(Contract NAS3-20370)

(NASA-CR-159394) Avail: NTIS HC A04/MF A01 CSCL 11F

Three Fe-12Ni alloys, individually alloyed with small amounts of V, Ti, and Al, were manufactured through different melting techniques, with special emphasis on electroslag remelting, in order to achieve different levels of metal purity and associated costs. The relative effectiveness of these melting techniques was evaluated from tensile and slow bend fracture toughness behavior at 25 C and -196 C after tempering the test specimens at various temperatures. The best melting procedure was vacuum induction melting (VIM) with or without electroslag remelting (ESR). VIM+ESR is the recommended procedure since ESR provides increased yield of plate product, a reduction of overall manufacturing costs and, depending on the alloy composition, improved tensile and fracture toughness properties. G.G.

N79-12203*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

FRETTING WEAR OF IRON, NICKEL, AND TITANIUM UNDER VARIED ENVIRONMENTAL CONDITIONS

Robert C. Bill, (AVRADCOM Res. and Technol. Labs.) 1978 30 p refs Proposed for presentation at the Intern. Conf. Wear of Mater., Dearborn, Mich., 16-18 Apr. 1979; sponsored by ASME, ASLE, ASM, ASTM-62, SAE, SME, Am. Chem. Soc., AIME, and APS

(NASA-TM-78972; AVRADCOM-TR-78-59; E-9745) Avail: NTIS HC A03/MF A01 CSCL 11F

Fretting wear experiments were conducted on high purity iron, nickel and titanium in air under conditions of varied humidity and temperature, and in nitrogen. For iron and titanium, maximum fretting occurred at 10 and 30 percent relative humidity respectively. Nickel showed a minimum in fretting wear at about 10 percent relative humidity. With increasing temperature, all three metals initially showed reduced fretting wear, with increasing wear observed as temperatures increased beyond 200-300 C. For titanium, dramatically reduced fretting wear was observed at temperatures above 500 C, relatable to a change in oxidation kinetics. All three metals showed much less fretting wear in N2 with the presence of moisture in N2 having a proportionally stronger effect than in air. Author

N79-12204*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

WEAR OF SEAL MATERIALS USED IN AIRCRAFT PROPULSION SYSTEMS

Robert C. Bill and Lawrence P. Ludwig 1978 30 p refs Presented at the Mater. and Processing Congr., Philadelphia, 7-9 Nov. 1978 Prepared in cooperation with Army Aviation Research and Development Command, St. Louis, Mo.

(NASA-TM-79003; E-9789; AVRADCOM-TR-78-47) Avail: NTIS HC A03/MF A01 CSCL 11F

The various types of seal locations in a gas turbine engine are described, and the significance of wear to each type is reviewed. Starting with positive contact shaft seals, existing material selection guidelines are reviewed, and the existing PV (contact pressure X sliding velocity) criteria for selecting seal materials are discussed, along with the theoretical background for these criteria. Examples of wear mechanisms observed to operate in positive contact seals are shown. Design features that can extend the operating capabilities of positive contact seals, including pressure balancing and incorporation of hydrodynamic lift are briefly discussed. It is concluded that, despite the benefits arising from these design features, improved positive contact seal materials from the standpoint of wear, erosion and oxidation resistance will be necessary for further improvements in seal performance and durability, and to meet stringent future challenges. Author

N79-12205*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

SHEAR RUPTURE OF A DIRECTIONALLY SOLIDIFIED EUTECTIC GAMMA/GAMMA PRIME - ALPHA (Mo) ALLOY

Fredric H. Harf 1978 15 p refs Presented at the Conf. on In-Situ Composites 3, Boston, 27 Nov. - 1 Dec. 1978; sponsored by the Mater. Res. Soc.

(NASA-TM-79038; E-9840) Avail: NTIS HC A02/MF A01 CSCL 11F

Directionally solidified Mo alloys are evaluated to determine the shear rupture strength and to possibly improve it by microstructural and heat treatment variations. Bars of the alloy containing nominally 5.7% Al and 33.5% Mo by weight with balance Ni were directionally solidified at rates between 10 and 100 mm per hour in furnaces with thermal gradients at the liquid-solid interface of 250 or 100 C per cm. A limited number of longitudinal shear rupture tests were conducted at 760 C and 207 MPa in the as - solidified and in several heat treated conditions. It is shown that shear rupture failures are partly transgranular and that resistance to failure is prompted by good fiber alignment and a matrix structure consisting mainly of gamma prime. Well aligned as - solidified specimens sustained the shear stress for an average of 81 hours. A simulated coating heat treatment appeared to increase the transformation of gamma to gamma prime and raised the average shear life of aligned specimens to 111 hours. However, heat treatments at 1245 C and especially at 1190 C appeared to be detrimental by causing partial solutioning of the gamma prime, and reducing lives to 47 and 10 hours, respectively. G.G.

N79-12206# Illinois Univ. at Urbana-Champaign, Urbana. Coordinated Science Lab.

ANNEALING STUDIES OF BERYLLIUM IN GALLIUM ARSENIDE AND GALLIUM ARSENIDE PHOSPHIDE Ph.D. Thesis

William Victor McLevige Dec. 1977 110 p refs

(Contracts DAAB07-72-C-0259; N00014-76-C-0806)

(AD-A057645; R-802; UILU-ENG-77-224915) Avail: NTIS HC A06/MF A01 CSCL 20/12

Differential resistivity and Hall effect measurements, secondary ion mass spectrometry (SIMS), and low temperature (5 K) photoluminescence are utilized to study the annealing behavior of ion-implanted beryllium in GaAs and GaAs(0.6)P(0.4), and of beryllium incorporated in GaAs during growth by molecular beam epitaxy (MBE). Author (GRA)

N79-12207# Lockheed-California Co., Burbank. Structures and Materials.

COMPARISON OF ENGINEERING PROPERTIES OF 7050-T7E73 AND 7075-T6510 EXTRUSIONS FOR POTENTIAL P-3 APPLICATIONS Final Report, 30 Nov. 1976 - 27 Feb. 1978

Roy W. Brodie and Leon Bakow Feb. 1978 111 p refs

(Contract N62269-77-C-0024)

(AD-A058002; LR-28499; NADC-76269-30) Avail: NTIS HC A06/MF A01 CSCL 11/6

7050-T7E73 extrusion material was procured in P-3 wing spar cap and plank shapes for direct comparative testing with current 7075-T6510 production extrusions. Three lots of 7050-T7E73 were produced and processed in production facilities to be representative of actual part fabrication. Comparable 7075-T6 tensile strengths and improved exfoliation, and fatigue properties were obtained with the 7050-T7E73 material. Significant improvements were obtained in crack propagation in approximately 40% R.H. and approximately 98% R.H. environments where the crack growth threshold showed an approximately 30% increase and the crack growth rate was approximately 67% slower for the 7050-T7E73 material. The 7050-T7E73 also had a 60 to 70% improvement in fracture toughness at room temperature and -65 F over the 7075-T6510 material and the -65 F toughness of 7050-T7E73 was 30% higher than the room temperature toughness of 7075-T6510. Author (GRA)

N79-12208# Westinghouse Electric Corp., Pittsburgh, Pa. Advanced Energy Systems Div.

EVALUATION OF FRICTION PROPERTIES OF SHEET FORMING LUBRICANTS BY TENSILE DRAWING AND BY

RING COMPRESSION Final Technical Report, 1 May 1977 - 15 Feb. 1978
F. J. Gurney and Attwell M. Adair (AFML, Wright-Patterson AFB, Ohio) May 1978 60 p refs
(Contract F33615-77-C-5099; AF Proj. 7351)
(AD-A058271; AFML-TR-78-66) Avail: NTIS HC A04/MF A01 CSCL 11/6

Experimental and selected commercially available sheet forming lubricants were evaluated by two friction testing techniques; (1) strip-drawing with only elastic workpiece loads and (2) ring compression testing where plastic deformation of the workpiece occurred. Material and test variables examined were: (1) two workpiece materials Al-7075 and Ti-6Al-4V, (2) eight lubricants coatings, (3) three levels of hold-down pressure and deformation amount, (4) two die roughness conditions, (5) two drawing speeds and (6) two lubricant dryness conditions. The tests were performed at room temperature. Results indicate that the lubricant dryness condition can be a significant factor in friction characteristics of the lubricant. Of the other variables, the lubricant type caused the most influence on the resultant friction characteristics. Quantitative ratings of each lubricant were obtained as a function of the test variables. Author (GRA)

N79-12209# Phrasor Technology, Durarte, Calif.
DEVELOPMENT OF A TABLE TOP MODEL FOR THE GENERATION OF AMORPHOUS/MICROCRYSTALLINE METAL POWDERS Interim Technical Report, 1 May 1977 - 30 Apr. 1978
John F. Mahoney, Bernard F. Kalensher, Julius Perel, and Kenneth E. Vickers Jun. 1978 72 p refs
(Contract N00014-77-C-0373; ARPA Order 3363)
(AD-A058009; Rept-78-1) Avail: NTIS HC A04/MF A01 CSCL 11/6

The electrohydrodynamic (EHD) technique for the generation of liquid droplets was employed to produce micron size metal powders. This was accomplished using a laboratory feasibility model apparatus which was developed on the program. The aim of the program is the development of a table top powder generator capable of controlled production of ultrafine powders at high cooling rates. The table top generator is to be used in the fundamental studies of the effect of solidification variables on microstructures and the development of new alloy compositions. New ceramic EHD sources were developed capable of operating up to 1400 C with promise of little or no corrosion. Particles below 0.1 to 100 micron were generated with cooling rates extending up to 1,000,000 K/second. Coatings a few microns thick were made on metal substrates with no layering effects observed in the coatings. In addition, evidence of welding between a splat foil and the metal substrate was seen. Analytical studies indicate that equations defining the cooling of submicron particles can not be obtained from simple extrapolation of macroscopic heat transfer theory. Author (GRA)

N79-12210# Materials Research Labs., Ascot Vale (Australia).
EFFECT OF AGING ON THE HARDNESS AND TENSILE PROPERTIES OF ALUMINUM ALLOY 7001 WITH SPECIAL REFERENCE TO THE INFLUENCE OF DELAY TIME BETWEEN THE QUENCHING AND AGEING TREATMENTS
J. H. Cole Mar. 1978 22 p refs
(AD-A059165; MRL-TN-411) Avail: NTIS HC A02/MF A01 CSCL 11/6

The change in hardness of aluminum alloy 7001 with time at temperatures 22 C, 50 C and 121 C following quenching from solution heat treatment at 460 C has been determined. At 22 C, natural ageing caused a hardness increase from 104 HV to 191 HV in 6 1/2 years and the hardness was still rising. Ageing at 50 C caused an increase in hardness from 104 HV to 179 HV in 96 h and the hardness was still rising. After approximately 72 h at 121 C a peak hardness of 216 HV was reached. Subsequent heating at 121 C after various periods of time up to 4 years at 22 C and 96 h at 50 C caused an initial reversion in hardness. Delay times varying from zero to 217 days at 22 C between quenching and ageing at 121 C for 24 h did not appear to have any significant effect on the hardness and tensile properties. Author (GRA)

N79-12211# Atomics International Div., Golden, Colo. Rocky Flats Plant.
MICROSTRUCTURAL STABILITY OF 21-6-9 STAINLESS STEEL
R. W. Krenzer and E. C. Sanderson 18 May 1978 13 p refs
(Contract EY-76-C-04-3533)
(RFP-2668) Avail: NTIS HC A02/MF A01

Parameters for the thermomechanical processing of 21-6-9 stainless steel were defined. This steel is one of the nitrogen-strengthened chromium, manganese, and nickel austenitic stainless steels having mechanical properties that can be improved by a combination of plastic deformation and heat treatments. By heat-treating coupons, the time-temperature relationship of the precipitate phase, and the solutionizing, recrystallizing, and stress-relieving temperature ranges in 21-6-9 were established. Mechanical properties and microstructure as a function of percent deformation and stress-relieving temperature are reported. DOE

N79-12212# Sandia Labs., Albuquerque, N. Mex.
COMPACTION STUDIES OF PALLADIUM/ALUMINUM POWDERS
O. L. Burchett, M. R. Birnbaum, and C. T. Olen 1978 27 p refs Presented at 6th Pyrotech. Seminar, Estes Park, Colo., 17 Jul. 1978
(Contract EY-76-C-04-0789)
(SAND-78-0486C; Conf-780706-3) Avail: NTIS HC A03/MF A01

Predicted and experimentally determined density gradients in palladium/aluminum mixtures of differing weight fractions were compared. A modified constitutive equation for porous media was used to predict the density gradients. The predicted density gradients correlate well with radiographic data obtained from radiographs of compacted pellets. The correlation established that the density gradients in compacted pyrotechnic pellets can be analytically determined without resorting to difficult and time consuming radiographic methods. DOE

N79-12213*# National Bureau of Standards, Washington, D. C.
NBS: PROPERTIES OF ELECTRONIC MATERIALS Annual Report, 1 Apr. 1977 - 31 Mar. 1978
J. R. Manning and R. L. Parker Jun. 1978 117 p refs
(NASA Order H-27954-B)
(NASA-CR-157621; PB-283707/8; NBSIR-78-1483) Avail: NTIS HC A06/MF A01 CSCL 11F

The NBS work for NASA in support of NASA's Materials Processing in Space Program is described. The NBS program has two main thrusts: (1) Carrying out precision measurements in space and investigating the feasibility of improved measurements when the space environment offers a unique opportunity for performing such measurements. These measurements would be useful for either space processing or processes on the ground. (2) Obtaining precision measurements on materials properties when these properties are important to the design and interpretation of space processing experiments. These measurements would be carried out either in space or on the ground. GRA

N79-12214# National Technical Information Service, Springfield, Va.
TITANIUM AND TITANIUM ALLOY CREEP. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Sep. 1978
Mona F. Smith Sep. 1978 186 p Supersedes NTIS/PS-77/0803; NTIS/PS-76/0645; NTIS/PS-75/538
(NTIS/PS-78/0970/0; NTIS/PS-77/0803; NTIS/PS-76/0645; NTIS/PS-75/538) Avail: NTIS HC $28.00/MF $28.00 CSCL 11F

Research is cited on creep of titanium and its alloys with regard to composition, stress corrosion, fatigue, fracture, and microstructure. Tests are described on varying conditions of temperatures, pressures, and atmospheres. Processing and metalworking are covered for their relationship to creep resistance. Many reports deal with applications to aircraft, spacecraft, and nuclear reactors. This updated bibliography contains 180 abstracts, 12 of which are new entries to the previous edition. GRA

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N79-12215 North Carolina State Univ. at Raleigh.
SYNTHESIS OF BIODEGRADABLE BLOCK AND GRAFT POLYMERS BY STEP GROWTH POLYCONDENSATION, PART 1. PREPARATION OF BIODEGRADABLE GRAFT AND BLOCK POLYMERS BY AN ADDITION REACTION, PART 2 Ph.D. Thesis
Benjamin Grant Penn 1978 118 p
Avail: Univ. Microfilms Order No. 7820064

Hydroxy and isocyanate-terminated ABC block copolymers were prepared where A is a noncellulosic oligomer and B is a cellulosic oligomer. Deacetylation of the polymers with sodium methoxide resulted in the formation of block polymers containing cellulosic oligomeric blocks. The degradation of the deacetylated polymers in the presence of the enzymes cellulysin and cellulase was examined. Graft polymers were synthesized. The ability of graft polymers to degrade in the presence of the the enzyme cellulysin at 50C and pH 5 was demonstrated. It was also demonstrated that graft polymers consisting of a cellulosic backbone with a synthetic polymer grafted onto it by an addition polymerization mechanism are biodegradable. It was demonstrated that depolymerized cellulose triacetate can be mercaptoethylated. Dissert. Abstr.

N79-12216 North Carolina State Univ. at Raleigh.
THE SYNTHESIS OF BIODEGRADABLE BLOCK COPOLYMERS CONTAINING AMYLOSE OLIGOMERIC BLOCKS Ph.D. Thesis
Michael Matthew Lynn 1978 101 p
Avail: Univ. Microfilms Order No. 7820063

Block co- and terpolymers containing an amylose oligomeric block were synthesized using a five-step reaction scheme. Amylose was completely acetylated by acetic anhydride forming tri-O-acetyl amylose (ATA). ATA was hydrolyzed by hydronium ions producing an hydroxy terminate amylose triacetate oligomer (HATA). A prepolymer was formed by reacting HATA with either diphenylmethane diisocyanate (MDI) or toluene diisocyanate (TDI). The prepolymer was then reacted with hydroxy terminated polybutadiene (PBD), poly(propylene glycol) (PPG) or poly(ethylene-co-propylene adipate) (PEPA) to form linear block copolymers of the ABA type. Block co- and terpolymer formation was demonstrated by molecular weight increases as shown by intrinsic viscosity and gel permeation chromatography, by infrared and proton NMR spectra, by elemental analysis and by selective solvent extractions. Dissert. Abstr.

N79-12217 Illinois Univ. at Urbana-Champaign, Urbana.
POLYMER BOUND SCHIFF BASE COMPLEXES Ph.D. Thesis
John Henry Gaul, Jr. 1978 190 p
Avail: Univ. Microfilms Order No. 7820943

Two types of base containing polymers were prepared to investigate the question of site separation in coordinate polymer complexes. Co(2) and Cu(2), four coordinate complexes, were incorporated into pyridine and imidazole containing resins through axial coordination to the base residues. The ability of the pyridine polymer to coordinate the Co(2) and Cu(2) species, was examined and found to be limited whereas the imidazole polymer binds these species very strongly. The synthesis and characterization of novel multidentate chelating polymers is described. The heretofore unreported complex (Fe(SalMeDPT) was also prepared and characterized by Mossbauer analysis. The polymer resin (P)-Co(SalDPT) was used in catalytic oxidations of substituted phenols and microreticular resin catalysts were employed. Dissert. Abstr.

N79-12218 Stevens Inst. of Tech., Hoboken, N. J.
SMALL-ANGLE X-RAY SCATTERING FROM BRANCHED POLYMERS IN SOLUTION Ph.D. Thesis
Sunil Krishna Garg 1978 157 p
Avail: Univ. Microfilms Order No. 7821618

Fractions of dextran, a branched polysaccharide, were examined in water at 25 C. Also studied was a series of model branched polystyrenes, synthesized in MEK at 25 C. In the latter system, small angle X-ray scattering was obtained as a function of branch length while maintaining branching frequency and backbone length constant. Persistence length was found to decrease with increasing number of branches, and, to a somewhat lower extent, with increasing length of branches. The hydrodynamic length, calculated from the X-ray scattering data, was found to be identical with the length of the backbone of the branched polymer. Dissert. Abstr.

N79-12219 Massachusetts Univ., Amherst.
QUASI-ELASTIC LIGHT SCATTERING STUDY OF THE POLYELECTROLYTE Na-COPOLY (ETHYL ACRYLATE-ACRYLIC ACID) Ph.D. Thesis
Stephanie Louisa Wunder 1978 272 p
Avail: Univ. Microfilms Order No. 7820393

The translational diffusion constants of fractions of the polyelectrolyte Na-copoly (ethyl acrylate-acrylic acid) was measured both in aqueous salt solutions as a function of ionic strength and in an organic theta solvent, 2 Heptanone. Since the samples were polydisperse, a method was developed to obtain a z-average diffusion constant. The results were analyzed within the framework of the two parameter theory of polymer solutions. Dissert. Abstr.

N79-12220 City Univ. of New York.
RADIATION-INDUCED GRAFT POLYMERIZATION OF 4-VINYLPYRIDINE TO POLYETHYLENE Ph.D. Thesis
Arif Ahmet Derman 1978 107 p
Avail: Univ. Microfilms Order No. 7816127

The radiation-induced graft polymerization of 4-vinylpyridine to high density polyethylene films was studied under a wide range of reaction conditions of initiation rate, monomer concentration, and polymer film thickness. The reaction conditions were chosen to include both diffusion-free and diffusion controlled graft polymerization. The grafting rate was found to be independent of polymer film thickness at low thickness. At high thicknesses, the rate was inversely dependent on the first power of thickness. The dependence of the grafting rate on the initiation rate was 1/2 order for low polymer film thicknesses and low radiation intensities but changed to 1/4 order at high thicknesses and high intensities. The grafting rate was first order in monomer at low radiation intensities and low thicknesses but 1/2 order at high intensities and high thicknesses. Dissert. Abstr.

N79-12221* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THERMAL INSULATION ATTACHING MEANS Patent
Lubert J. Leger, inventor (to NASA) Issued 7 Nov. 1978 5 p Filed 12 Apr. 1977 Supersedes N7731237 (15 - 22, p 2908) Continuation-in-part of abandoned US Patent Appl. SN-555750 filed 5 Mar. 1975
(NASA-Case-MSC-12619-2; US-Patent-4,124,732; US-Patent-Appl-SN-786913; US-Patent-Class-428-77; US-Patent-Class-244-121; US-Patent-Class-244-158; US-Patent-Class-244-160; US-Patent-Class-428-189; US-Patent-Class-428-212; US-Patent-Class-428-332; US-Patent-Class-428-280; US-Patent-Class-428-285; US-Patent-Class-428-286; US-Patent-Class-428-447; US-Patent-Class-428-450; US-Patent-Class-428-920; US-Patent-Appl-SN-555750) Avail: US Patent and Trademark Office CSCL 11A

An improved isolation system is provided for attaching ceramic tiles of insulating material to the surface of a structure to be protected against extreme temperatures of the nature expected to be encountered by the space shuttle orbiter. This system isolates the fragile ceramic tiles from thermally and mechanically induced vehicle structural strains. The insulating tiles are affixed to a felt isolation pad formed of closely arranged and randomly oriented fibers by means of a flexible adhesive and in turn the felt pad is affixed to the metallic vehicle structure by an additional layer of flexible adhesive.
Official Gazette of the U.S. Patent and Trademark Office

N79-12222*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

STRAIN-RATE/TEMPERATURE BEHAVIOR OF HIGH DENSITY POLYETHYLENE IN COMPRESSION

Linda L. Clements and Oleg D. Sherby (Stanford Univ., Calif.) Nov. 1978 10 p refs

(NASA-TM-78544; A-7679) Avail: NTIS HC A02/MF A01 CSCL 07C

The compressive strain rate/temperature behavior of highly linear, high density polyethylene was analyzed in terms of the predictive relations developed for metals and other crystalline materials. For strains of 5 percent and above, the relationship between applied strain rate, dotted epsilon, and resulting flow stress, sigma, was found to be: dotted epsilon exp times (Q sub f/RT) = k'(sigma/sigma sub c) to the nth power; the left-hand side is the activation-energy-compensated strain rate, where Q sub f is activation energy for flow, R is gas constant, and T is temperature; k is a constant, n is temperature-independent stress exponent, and sigma/sigma sub c is structure-compensated stress. A master curve resulted from a logarithmic plot of activation-energy-compensated strain rate versus structure-compensated stress. Author

N79-12223*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

DEVELOPMENT OF SPRAYED CERAMIC SEAL SYSTEMS FOR TURBINE GAS PATH SEALING

Robert C. Bill (AVRADCOM Res. and Technol. Labs), L. T. Shiembob (Pratt and Whitney Aircraft Group, East Hartford, Conn.), and O. L. Stewart (Pratt and Whitney Aircraft Group, East Hartford, Conn.) 1978 22 p refs Presented at the Winter Ann. Meeting, San Francisco, 10-15 Dec. 1978; sponsored by Am. Soc. of Mech. Engr.

(NASA-TM-79022; E-9819; AVRADCOM-TR-78-52) Avail: NTIS HC A02/MF A01 CSCL 11A

A ceramic seal system is reported that employs plasma-sprayed graded metal/ceramic yttria stabilized zirconium oxide (YSZ). The performance characteristics of several YSZ configurations were determined through rig testing for thermal shock resistance, abradability, and erosion resistance. Results indicate that this type of sealing system offers the potential to meet operating requirements of future gas turbine engines. G.G.

N79-12224# Swedlow, Inc., Garden Grove, Calif.

MANUFACTURING METHODS AND TECHNOLOGY (MM AND T) PROJECT TO ESTABLISH PRODUCTION TECHNIQUES TO MANUFACTURE RIGID ARMOR FOR RADAR ANTENNA HARDENING Quarterly Reports, 1 Sep. 1977 - 28 Feb. 1978

R. Doerr Aug. 1978 19 p

(Contract DAAB07-77-C-0476)

(AD-A057983; SI-ER-915-2-3; QR-2; QR-3) Avail: NTIS HC A02/MF A01 CSCL 19/4

A basic step involved in the preparation of the polypropylene film prior to its lamination into a ballistic panel involves the orienting or stretching of the film. Processing problems have been encountered by the vendor selected for this task. Using processing steps that vary from those used successfully in previous development work, the vendor has not as yet produced satisfactory oriented film and his ability to process film that will meet specification requirements is in doubt. As an immediate solution to this problem, AMMRC is planning to supply sufficient material for the engineering and confirmatory sample panel fabrication phase. Alternate possible sources for the balance of the oriented film required for the program are noted in this report. Subscale process development work has been initiated and some of the molding characteristics and problems have been identified. Major tooling for the program has been received, inspected, and functionally checked. Author (GRA)

N79-12225# Universal Energy Systems, Inc., Dayton, Ohio.

ELECTRON SPECTROSCOPIC STUDIES OF SURFACES AND INTERFACES FOR ADHESIVE BONDING Interim Report, Jan. 1977 - Jan. 1978

John T. Grant and Gerald E. Hammer May 1978 54 p refs

(Contract F33615-77-C-5040; AF Proj. 2303)

(AD-A057784; AFML-TR-78-46) Avail: NTIS HC A04/MF A01 CSCL 13/8

This report describes work carried out in the first twelve months of a twenty-eight month contract to study the interaction of simple organic molecules on aluminum and titanium surfaces prepared for adhesive bonding using electron spectroscopic techniques. Other electron spectroscopic studies of specimens related to the surface phenomena program are also reported. Author (GRA)

N79-12226# North Dakota State Univ., Fargo.

WATERBORNE COATINGS FOR AIRCRAFT Interim Report, 1 Jun. - 31 Dec. 1977

Loren W. Hill May 1978 34 p refs

(Contract F33615-77-C-5003; AF Proj. 2422)

(AD-A057783; AFML-TR-78-44) Avail: NTIS HC A03/MF A01 CSCL 01/3

The purpose of this work was to determine the potential of waterborne polymers for use in high performance coatings for aircraft. The impetus for replacing current solvent-borne aircraft topcoats and primers is to reduce air pollution associated with solvent emissions. The approach was to obtain information on current waterborne technology by carrying out a literature search and by consultations with coatings scientists from coatings companies, raw materials suppliers, and institutes. The information obtained was evaluated with regard to suitability of various waterborne coatings for use under conditions required in aircraft coating procedures such as spray application and ambient-temperature cure. It was concluded that none of the currently available waterborne systems are suitable for replacement of current Air Force topcoats and primers without additional research and development. Waterborne replacements under current development were ranked according to potential for achieving the high performance required of aircraft coatings, and some of the problems anticipated for each type were identified. Author (GRA)

N79-12227# Oak Ridge National Lab., Tenn.

INVERSE MEAN FREE PATH, STOPPING POWER, CSDA RANGE, AND STRAGGLING IN POLYSTYRENE FOR ELECTRONS OF ENERGY LESS THAN OR EQUAL TO 10 keV

J. C. Ashley, C. J. Tung, R. H. Ritchie, and V. E. Anderson Feb. 1978 38 p refs Sponsored by DOE

(AD-A057881; RADC-TR-78-32; SR-1) Avail: NTIS HC A03/MF A01 CSCL 11/9

The interaction of electrons with solid polystyrene, -(C8H8)-, is described based on a model insulator theory to account for the response of the valence electrons, and carbon K-shell ionization cross sections derived from atomic, generalized oscillator strengths. Contributions to the inverse mean free path and energy loss due to these two excitation processes are tabulated for incident electrons with energies from 5 eV to 10 keV. Electron ranges in the continuous-slowing-down approximation and straggling are tabulated for electrons with energies from 15 eV to 10 keV. Author (GRA)

N79-12228# Ultrasystems, Inc., Newport Beach, Calif.

DETERMINATION OF FLUOROCARBON ETHER AUTOXIDATIVE DEGRADATION MECHANISM Final Report, 16 Jun. 1975 - 15 Jun. 1977

K. L. Paciorek, R. Kratzer, J. Kaufman, and J. H. Nakahara Wright-Patterson AFB, Ohio AFML Aug. 1977 53 p refs

(Contract F33615-75-C-5201)

(AD-A057785; SN-8288-F; AFML-TR-77-150) Avail: NTIS HC A04/MF A01 CSCL 11/8

Elucidation of mechanisms operative in thermal oxidative degradation of hexafluoropropene oxide derived polyethers and the effect of metals and anti-oxidant/anti-corrosion additives on this process are reported. Thermal oxidative instability of the commercial fluid, Krytox MLO-71-6, at moderate temperatures (550 F) was found to be due to the presence of approx. 3% of hydrogen terminated chains; treatment at 650 F in oxygen volatilized these chains by unzipping. The hydrogen-free fluid was unaffected by oxygen at 650 F and by M-50 and Ti(4Al, 4Mn) alloys at 600 F in oxidizing atmospheres. M-50 alloy catalyzed the degradation of the hydrogen terminated chains below and at 600 F, but did not affect the remainder of the fluid at these temperatures. At 650 F a chain scission process promoted by the metals constituting the alloy or their oxides or fluorides came into play. Ti(4Al, 4Mn) alloy in the presence of CF3COF and COF2, formed via decomposition of hydrogen

terminated chains, degraded poly(hexafluoropropene oxide) fluids at 550 F by chain scission. The additive MLO-76-30 arrested Krytox MLO-71-6 thermal oxidative degradation at 600 F and below both in the absence and in the presence of metals by preventing the degradation of the hydrogen terminated chains.
GRA

N79-12229# Midwest Research Inst., Kansas City, Mo.
HIGH PRESSURE AND TEMPERATURE EFFECTS ON THE VISCOSITY, DENSITY, AND BULK MODULUS OF FOUR LIQUID LUBRICANTS Final Technical Report, Jan. - Dec. 1977
Patrick J. Hogan and Vern Hopkins Jan. 1978 42 p refs
(Contract F33615-75-C-5116; AF Proj. 7343)
(AD-A057782; AFML-TR-78-5) Avail: NTIS HC A03/MF A01 CSCL 11/8

Absolute viscosity, kinematic viscosity, density, and secant bulk modulus values determined for four lubricating fluids are presented. The determinations were made with a falling weight viscometer at temperatures of 38 C (100 F) 99 C (210 F), and 149 C (300 F) and at pressures ranging from atmospheric to 1103 MPa (160,000 psi). Plots of absolute viscosity, density, and bulk modulus are given, and all results are discussed. The equipment used to make the determinations is described and the procedures that were followed to collect data and reduce to fluid property values are outlined. The fluids were designated MLO 75-122, MLO 76-121, MLO 77-39, and MLO 77-46.
Author (GRA)

N79-12230# Southwest Research Inst., San Antonio, Tex.
COMPRESSIVE STRENGTH AND INDENTATION DAMAGE IN CERAMIC MATERIALS Technical Report, 1 Sep. 1977 - 31 May 1977
James Jr. Lankford and David L. Davidson 31 May 1978 34 p refs
(Contract N00014-75-C-0668)
(AD-A057790) Avail: NTIS HC A02/MF A01 CSCL 11/2

The extent of the plastically deformed region associated with indentation in silicon carbide is determined by means of selected area electron channeling. It is found that the extent of the plastic zone beneath an indent is quite large, i.e., equal to about five times the impression radius. Microcrack formation is studied in the SEM, and the combined results are discussed in terms of current elastic-plastic indentation fracture models. The first cracks to form are radial microcracks; their morphology, and the observed indentation plastic zone dimensions, support the elastic-plastic model of Perrott for indentation cracking in alpha-SiC. In addition, scanning electron microscopy and acoustic emission have been used to characterize the microfracture mechanisms responsible for the temperature-sensitive compressive strength behavior of polycrystalline Al2O3 and alpha-SiC. It is determined that the early stages of damage can be related to the presence or absence of microplasticity, depending upon the ceramic. Further, local plastic flow in alpha-SiC is clearly observed to commence during compression at temperatures as low as 500 C, and at stresses not much greater than the tensile strength. GRA

N79-12231# Army Military Center, Alexandria, Va.
EFFECTS OF EXTENSIONAL FLOW ON POLYSTYRENE IN DILUTE SOLUTIONS M.S. Thesis. Final Report
William Alan Sweet 11 Aug. 1978 56 p refs
(AD-A057427) Avail: NTIS HC A04/MF A01 CSCL 07/4

Dilute solutions (0.025 to 0.05 wt.%) of polystyrene in toluene were placed in an extensional flow field. The molecular weight distribution of the polymer was studied before and after being placed in the flow field by gel permeation chromatography. Monodispersed polystyrene showed no change in molecular weight distribution after passing through the flow field. These results are contrary to those of P. Leopairat (MIT PhD Thesis; 1977). It is suggested that the degradation Leopairat observed was due to an artifact in the apparatus he used. Author (GRA)

N79-12232# Technion - Israel Inst. of Tech., Haifa. Material Mechanics Lab.
UNIAXIAL CYCLIC LOADING OF ELASTIC-VISCOPLASTIC MATERIALS Interim Report
S. R. Bodner, I. Partom, and Y. Partom Jun. 1978 34 p refs
(Grant AF-AFOSR-2607-74; AF Proj. 2307)
(AD-A058875; MML-61; AFOSR-78-1298TR) Avail: NTIS HC A03/MF A01 CSCL 20/11

Elastic-viscoplastic constitutive equations based on two internal state variables are utilized to determine material response for uniaxial cyclic loading conditions. These equations are capable of representing the principal features of cyclic loading behavior including softening upon stress reversal, cyclic hardening or softening, tendency towards a stable limit cycle, cyclic relaxation, and cyclic creep. Calculations were performed for various stress and strain controlled conditions using material constants intended to represent commercially pure titanium and aluminum and OFHC copper. Capabilities and limitations of the analytical formulations are discussed in relation to computed results and corresponding test data. Author (GRA)

N79-12233# Battelle Columbus Labs., Ohio.
AN INVESTIGATION OF THE EFFECTS OF OXYGEN AND WATER VAPOR ON THE COMPRESSIVE FILM STRENGTH OF BOUNDARY FILMS ON IRON SUBSTRATES, PART 2 Annual Report
E. J. Drauglis, J. W. Kissel, and D. K. Snediker 8 Aug. 1978 36 p refs
(Grant AF-AFOSR-3051-76)
(AD-A058873; AFOSR-78-1358TR) Avail: NTIS HC A03/MF A01 CSCL 11/8

The objectives of this program are to study the effect of O2 and H2O on the compressive strength of boundary lubricant films on iron surfaces and to correlate these effects with the basic physical and chemical phenomena responsible for the formation and stabilization of the films and the converse phenomena of degradation and dissolution. The work described in this report is for the second year of a 3-year AFOSR program. In the second year of the program, the film penetration apparatus was modified to permit repeatable, routine measurements under controlled atmospheres. Experiments carried out in dry and wet air environments indicate that the presence of H2O has a strong retarding effect on the formation of strong boundary films from both pure ester and TCP solutions. The reaction rates were observed to increase sharply at temperatures above 105 - 110 C. Experiments carried out in dry and wet argon environments indicate that O2 is essential to the formation of compressively strong films. Weak films found in argon gained strength with exposure to air. GRA

N79-12234# Louisiana Dept. of Transportation and Development, Baton Rouge. Research and Development Section.
QUANTITATIVE X-RAY DIFFRACTION AND FLUORESCENCE ANALYSIS OF PAINT PIGMENT SYSTEMS Final Report
Kathlyn L. McMichael Jan. 1978 96 p Sponsored by Federal Highway Admin.
(PB-283773/0; LA-76-1CH(B); FHWA/LA-78/114) Avail: NTIS HC A05/MF A01 CSCL 11C

An attempt is made to correlate measured X-ray intensities with concentrations of each member of paint pigment systems, thereby establishing calibration curves for the quantitative analysis of such systems. The results showed the instrument is useful as intended, provided paint standards are obtained and the analyses are proven accurate for each specification prior to use. GRA

N79-12235# Carnegie-Mellon Inst. of Research, Pittsburgh, Pa.
INVESTIGATION OF INTERPENETRATING POLYMER NETWORKS FOR BIOLOGICAL APPLICATIONS Annual Report, 1 Apr. 1977 - 31 Mar. 1978
G. C. Berry, M. Elsabee, and M. S. Morgan Jan. 1978 105 p refs
(Contract N01-HV-3-2949)
(PB-284182/3; NIH-N01-HV-3-2949-9) Avail: NTIS HC A06/MF A01 CSCL 07D

A poly (ether-co-urethane), PEU sheet was modified by a sequential polymerization to produce hydrogel interpenetrating networks (IPN's). In one phase, uniform hydrogel IPN's with the hydrogel distributed nearly uniformly throughout the host PEU were prepared and submitted for evaluation. In the second phase, procedures were developed to prepare asymmetric hydrogel IPN's in which the hydrogel modification is confined to a region near the surface of the host PEU. GRA

N79-12236# National Bureau of Standards, Washington, D. C. Polymer Science and Standards Div.
AN EVALUATION OF EXISTING MODELS DESCRIBING THE MIGRATION OF ADDITIVES IN POLYMERS Final Semi-Annual Report, 1 Sep. 1977 - 30 Mar. 1978
I. C. Sanchez, S. S. Chang, F. L. McCrackin, and L. E. Smith Jul. 1978 71 p
(PB-284492/6; NBSIR-78-1499) Avail: NTIS HC A04/MF A01 CSCL 13D

Mathematical models for describing the migration of a variety of small molecules in polymers that have applications in food contact uses are discussed and their ability to predict the amount of additive migration given any particular time and temperature history is assessed. Migration data applicable to food contact situations are reviewed from the current literature. Available models describing migration are surveyed and their present and potential utility is evaluated. GRA

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers, storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N79-12237 Purdue Univ., Lafayette, Ind.
THE EFFECT OF OXIDIZER PARTICLE SIZE DISTRIBUTION OF THE STEADY STATE COMBUSTION, EROSIVE BURNING AND NONSTEADY STATE COMBUSTION OF POLYDISPERSE COMPOSITE SOLID PROPELLANTS Ph.D. Thesis
James Allen Condon, III 1978 232 p
Avail: Univ. Microfilms Order No. 7821429

A theoretical analysis of the combustion of composite propellants(with an emphasis on the heterogeneous effects) is presented. The analysis is based on the combination of unique statistical treatment of the burning surface with a very comprehensive multiple flame type of physiochemical model for the combustion process. The analysis is divided into four parts: the steady state burning rate, the erosive burning rate, the pressure coupled response, and the velocity response. Dissert. Abstr.

N79-12238*# Martin Marietta Corp., Denver, Colo.
CRYOGENIC PROPELLANT DENSIFICATION STUDY Final Report, Jul. 1977 - Jul. 1978
R. O. Ewart and R. H. Dergance Nov. 1978 178 p refs
(Contract NAS3-21014)
(NASA-CR-159438; MCR-78-586) Avail: NTIS HC A09/MF A01 CSCL 21I

Ground and vehicle system requirements are evaluated for the use of densified cryogenic propellants in advanced space transportation systems. Propellants studied were slush and triple point liquid hydrogen, triple point liquid oxygen, and slush and triple point liquid methane. Areas of study included propellant production, storage, transfer, vehicle loading and system requirements definition. A savings of approximately 8.2 x 100,000 Kg can be achieved in single stage to orbit gross liftoff weight for a payload of 29,484 Kg by utilizing densified cryogens in place of normal boiling point propellants. G.G.

N79-12239# Forest Products Lab., Madison, Wis.
METHANOL FROM WOOD WASTE: A TECHNICAL AND ECONOMIC STUDY
A. E. Hokanson (Raphael Katzen Assoc., Cincinnati) and R. M. Rowell Jun. 1977 21 p refs
(FPL-12) Avail: NTIS HC A02/MF A01

A methanol-from-wood waste facility having a capacity of 50 million gallons per year requires 1,500 ovendry tons (ODT) of wood waste per day. The yield of methanol from wood is about 38 percent, or about 100 gallons per ODT of wood. This yield is based on all process energy required coming from the wood waste. At a wood waste cost of $15/ODT, the selling price of methanol is estimated at $0.77/gal; at $34/ODT, the selling price is $0.96/gal. Author

N79-12240# Aerojet Solid Propulsion Co., Sacramento, Calif.
HANDBOOK, STRUCTURAL DESIGN NOMOGRAPH FOR THERMAL CYCLING OF TACTICAL ROCKET PROPELLANTS
K. W. Bills, Jr. Dec. 1977 76 p refs
(Contract N00123-76-C-1283; WF31300300)
(AD-A057447; NWC-TM-3365) Avail: NTIS HC A05/MF A01 CSCL 21/9

The Structural Design Nomograph (SDN) is an analytical device for predicting the conditions for failure of tactical rocket propellant grains. The nomograph discussed in this handbook considers these failures to be the result of repeated thermal cycling (under conditions where stress-ratcheting is prevented). The most practical use of the SDN is as a preliminary design tool that permits rapid and inexpensive calculations by both chemists and engineers from which they can assess the effects of design changes and variations in propellant mechanical properties. These analyses are relatively inexpensive since they can be performed about 20 to 50 times faster than the input time to the computer for the corresponding viscoelastic analyses. Also, no mathematical talents are required to conduct the nomographic analyses. They can be performed by non-engineering, non-mathematical personnel. The nomographic analysis involves approximations to the highly sophisticated, linear, thermo-viscoelastic stress and damage analyses. GRA

N79-12241# Georgia Inst. of Tech., Atlanta.
COMPLEX METAL HYDRIDES: HIGH ENERGY FUEL COMPONENTS FOR SOLID PROPELLANT ROCKET MOTORS Final Report, 1 Mar. 1968 - 31 Mar. 1978
E. C. Ashby 1 Aug. 1978 9 p refs
(Contract N00014-75-C-0307)
(AD-A057764) Avail: NTIS HC A02/MF A01 CSCL 21/9

During the past 10 years, work was carried out on the preparation of new and unusual simple and complex metal hydrides of the main group elements. Several new hydrides of propellant interest were prepared and the chemistry related to the preparation and reactions of the new hydrides, elucidated. The metals specifically covered in this work were lithium, beryllium, magnesium, zinc, aluminum, boron and copper. An effort was made to establish the fundamental chemistry leading to the preparation of new hydrides as well as the preparations themselves. Indeed, a number of serious errors in the literature were corrected and the basis for the chemistry of main group metal hydrides established. In addition, many new hydrides were prepared and characterized, some of which should have potential as solid rocket propellants, e.g., Li3AlH6, Li2BeH4, Li5BeH4, Li5CuH6, etc. GRA

N79-12242# Civil and Environmental Engineering Development Office, Tyndall AFB, Fla. Environmental Sciences Research Div.
OXIDATION OF HYDRAZINE IN AQUEOUS SOLUTIONS Interim Report, 6 Jan. 1977 - 1 Jan. 1978
Michael G. MacNaughton, Gregory A. Urda, and Sue E. Bowden Mar. 1978 37 p refs
(AD-A058239; CEEDO-TR-78-11) Avail: NTIS HC A03/MF A01 CSCL 21/4

The expanded use of hydrazine type fuels throughout the Air Force makes it imperative that current and accurate data be available on the potential environmental impact of these compounds. This report describes the chemistry of hydrazine in aqueous solutions under varying conditions of temperature, pH, ionic strength, salinity, hydrazine concentration, oxygen concentration, and in the presence of catalysts, and solid substrates. Results indicate that in the absence of Copper 2 as a catalyst, the degradation of hydrazine is slow. In five days a 1 x ten to the minus 4th power molar solution of hydrazine degraded less than 2% in distilled water, 40% in pond water and 20% in seawater. The addition of oxide and clay solids did not change the rate of degradation. Increasing the concentration of Copper 2 caused a major increase in the oxidation rate as did increasing temperature. Salinity and ionic strength changes caused minor variations in rate. The maximum degradation rate occurs between pH8 and 9. Oxygen concentrations in the range 0.5 to 40 mg/l had no measurable effect. Author (GRA)

N79-12243# Ogden Air Logistics Center, Hill AFB, Utah. Propellant Lab. Section.

PROPELLANT SURVEILLANCE REPORT LGM-30 F AND G STAGE 1. PHASE E, SERIES 5 (TP-H1011) Semiannual Report

John A. Thompson Jun. 1978 133 p
(AD-A057428; MANCP-396(78)) Avail: NTIS HC A07/MF A01 CSCL 21/9

This report contains propellant test results from cartons of TP-H1011 bulk propellant representing LGM-30 F and G First Stage Minuteman Motors. This report uses a statistical approach to analyze the bulk carton propellant data. Testing was accomplished in accordance with MMWRM Project M8293-4CWNL17514. The data from this test period are combined with data from previous testing and entered into the G085 computer for storage, analysis and regression analysis. From the statistical analysis of all data tested to date (thirteen years for F and G), significant degradation of the propellant does not appear likely for at least two years past the oldest data point. Each point on the regression plot represents the mean of all samples at that particular age. The number of samples at each point is indicated on the sample size summary sheet on the page accompanying each regression plot or group of regression plots. The data range at any age can be found by suitable inquiry of the G085 system. Author (GRA)

N79-12244# Army Armament Research and Development Command, Aberdeen Proving Ground, Md.

EQUIVALENT WEIGHT FACTORS FOR FOUR PLASTIC BONDED EXPLOSIVES: PBX-108, PBX-109, AFX-103 AND AFX-702 Final Report

Henry J. Goodman and Louis Giglio-Tos Apr. 1978 91 p refs
(AD-A057754; AD-E430077; ARBRL-TR-02057) Avail: NTIS HC A05/MF A01 CSCL 19/1

Four free-air, shock-front parameters, peak overpressure, positive impulse, time of arrival, and positive duration, were used to determine the equivalent weight factor for four plastic-bonded explosives; AFX-103, AFX-702, PBX-108, and PBX-109. The equivalent weight factor, a measure of explosive effectiveness relative to that of a scaled standard explosive, is the weight ratio of the weight of any subject explosive to the weight of a standard explosive (pentolite) for equal gage readings (pressure, time of arrival, etc.) at equal distances. The aluminized explosives, AFX-702 and PBX-109 were found to be more effective than the non-aluminized explosives, AFX-103 and PBX-108, over the distance interval, approximately one to eighteen meters, for which measurements were made. Theoretical computations show that the non-aluminized explosives examined have higher pressures than the aluminized explosives within ten charge radii of the explosive. An unexpectedly high-intensity electromagnetic pulse generated by the aluminized, plastic-bonded explosives made it impossible to make measurements at scaled distances less than 0.58 m/kg(to the 1/3 power). Author (GRA)

N79-12245# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.

PREDICTION OF SELECTED JET FUEL TEST RESULTS USING ASTM TEST METHOD D2887 DATA WITH MULTIPLE LINEAR REGRESSION ANALYSIS M.S. Thesis

Ronald W. Roof and Harvey Yates Jun. 1978 80 p refs
(AD-A059185; AFIT-LSSR-26-78A) Avail: NTIS HC A05/MF A01 CSCL 21/4

At the present time, to analyze a five gallon sample of JP-4 requires approximately 24 hours, with over thirty separate tests to determine overall sample acceptability. The time required to ship the sample from bases and distribution points to central laboratory facilities and to disseminate the results is considerable. This research attempted to identify those boiling points from the simulated distillation curve which could be used to predict other JP-4 test results such as API Gravity, Aniline Gravity Product, RVP, Water Separometer Index, Modified, without the requirement to perform these tests. The research used multiple linear regression techniques to obtain the algorithms for the above JP-4 tests. Models developed by these techniques did not attain the level of accuracy needed to delete the requirement for physically completing the above tests. However, several ideas are presented for use by future teams performing research in predicting fuel properties from simulated distillation data. Author (GRA)

N79-12246# Chem Systems, Inc., New York.

LIQUID PHASE METHANOL Interim Report

M. Sherwin and D. Blum May 1978 126 p
(EPRI Proj. 317-2)
(EPRI-AF-693) Avail: NTIS HC A07/MF A01

Work on the development of the Liquid Phase Methanol process on the laboratory, bench, and process development unit scales is reported. Laboratory work included the following: (1) Catalyst poisoning models were developed for sulfur (H2S) and chloride (CH3Cl) (ethylene and NO2 were determined nonpoisons); (2) unsuccessful attempts were made to produce higher alcohols by modifying the catalyst. Bench scale work included: (1) it was shown that the reactivity of 50 x 70 Mesh catalyst slurry is 35% higher than the normal 16 x 20 M consist; (2) it was shown that H2 deficient gases could be shifted in the methanol synthesis reactor; (3) a thirty-day continuous run was successfully completed with minimal catalyst activity loss; (4) it was found that reactor productivity could be significantly increased by displacing the approach to chemical equilibrium in the reactor exit. The PDU work consisted of several 5-day runs which demonstrate the basic operation of the process. The runs were clouded somewhat by catalyst deactivation. DOE

N79-12247# California Univ., Livermore. Lawrence Livermore Lab.

VARIATIONS IN THE DETONATION VELOCITY OF THE HIGH EXPLOSIVE LX-04-1

K. J. Scribner and E. G. Zaslawsky 27 Apr. 1978 23 p ref
(Contract W-7405-eng-48)
(UCRL-52460) Avail: NTIS HC A02/MF A01

The maximal likely variation in detonation velocity in a pressed part made of the plastic-bonded explosive LX-04-1 was investigated. The detonation velocity of any PBX is known to be a function of its composition and its density, which can be measured with sufficient precision. A statistical analysis of composition and density variations, from which detonation-velocity variations could be inferred was performed. The data base comprised compositional analyses of all lots of LX-04-1 used in W62 and W70 production, and density measurements obtained in destructive analysis of an approximately 2% sample of all of the W62 and W70 LX-04-1 parts. By control-chart theory, the maximal probable variation in detonation velocity in any pressed part of LX-04-1 was determined. DOE

N79-12248# Addis Translations International, Portola Valley, Calif.

MILLIMETER-WAVE MEASUREMENTS FOR THE TRANSMISSION AND REFLECTION OF DETONATION PLASMAS PRODUCED BY SOLID EXPLOSIVES

H. D. Vomstein and B. Koch Dec. 1977 20 p refs Transl. into ENGLISH of "Transmissions- und Reflexionsmessungen mit Hilfe von Millimeterwellen and Detonationsplasmen fester Sprengstoffe", Rept. ISL-T-3/68 Inst. Franco-Allemand de Rech., St. Louis, France, 7 Feb. 1968 Sponsored by DOE Prepared for Calif. Univ., Livermore. Lawrence Livermore Lab.
(UCRL-Trans-11315; ISL-T-3/68) Avail: NTIS HC A02/MF A01

Transmission and reflection coefficients of detonation plasmas produced by solid explosives are measured by means of millimeter waves and used to calculate their conductivity and relative permittivity. Because of the limited spatial resolution corresponding to the utilized wavelength of 8.6 mm, no quantitative statement can be made concerning the conductivity profile of the actual detonation front. The method provides only mean values over distances of a few millimeters inside the cloud of gas and smoke following the front. DOE

N79-12249# Southwest Research Inst., San Antonio, Tex.

IDENTIFICATION OF PROBABLE AUTOMOTIVE FUELS CONSUMPTION: 1985-2000, EXECUTIVE SUMMARY

May 1978 50 p Prepared in cooperation with SOHIO Petrol. Co., Cleveland; Standard Oil Co. of Ind., Whiting; and Cameron Engineers Inc., Denver
(Contract EY-76-C-04-3684)
(HCP/W3684-01/2) Avail: NTIS HC A03/MF A01

The principal factors and activities in the production of automotive fuels which have synthetic hydrocarbon constituents and alcohol fuels derived from coal are traced and discussed in detail. These include selection of reference raw materials, syncrude compositions for a variety of candidate conversion processes, and finished automotive fuels composition based upon domestic fuel demand projections for the time frame 1985-2000. In addition, those fuel-engine relationships pertinent to developing optimized automotive systems are discussed in relation to anticipated developments in propulsion systems technology. Projected compositions and performance of finished specification-quality automotive fuels for this time frame are not expected to differ significantly from those for today's fuels. Consequently, excessive undesirable compounds can be diluted to acceptable specifications levels by proportionate blending with petroleum feedstocks. DOE

N79-12250# Minnesota Legislature Science and Technology Project, St. Paul.
PARAMETERS FOR LEGISLATIVE CONSIDERATION OF BIOCONVERSION TECHNOLOGIES
Tom P. Abeles and Janna R. King Feb. 1978 45 p refs
(Grant NSF ISP-76-02379)
(PB-284742/4; NSF/RA-780198) Avail: NTIS
HC A03/MF A01 CSCL 21D

Conclusions and recommendations are reported that evolved from the examination of various models of biomass production of nonpetroleum fuels. It was determined that it was neither economically nor energetically wise at this time for Minnesota to commit itself to a gasohol program modelled after Nebraska's program. Instead of adopting the single source, large scale Nebraska model, it was concluded that Minnesota should do the pilot and demonstration plants for the production of ethanol on the small scale (farm or local co-op size), and encourage the utilization of a variety of feedstocks such as, sugar beets, grains and cellulosic residues. GRA

N79-12251# Environmental Protection Agency, Research Triangle Park, N.C. Office of Air Quality Planning and Standards.
NATIONAL EMISSIONS DATA SYSTEM (NEDS) FUEL USE REPORT (1974) Final Report
Apr. 1978 128 p
(PB-284658/2; EPA-450/2-77-031) Avail: NTIS
HC A01/MF A01 CSCL 21D

Annual estimates of total consumption of major fuels such as coal, fuel oil, natural gas, gasoline, diesel fuel, and a number of other comparatively minor fuels are summarized. The data are distributed according to major categories of air pollutant emissions sources and are reported for the nation as a whole and for individual states, territories, and the District of Columbia. GRA

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N79-12252 Duke Univ., Durham, N. C.
HIGH RESOLUTION DIELECTRIC CONSTANT MEASUREMENTS IN FLUID HELIUM NEAR THE LIQUID-GAS PHASE TRANSITION Ph.D. Thesis
Theodore Danos Doiron 1977 132 p
Avail: Univ. Microfilms Order No. 7810360

The dielectric constant was obtained from capacitance measurements made with a ratio-transformer bridge which resolved changes in the dielectric constant of 1 part in 10 to the 8th power. A brief introduction to the thermodynamics of the critical region and the general theory of the dielectric constant is followed by a discussion of recent theories which predict that while the dielectric constant is finite at the critical point, the slope delta epsilon/delta tau will diverge. The data are then analyzed and no evidence of a change in the dielectric constant is found. Dissert. Abstr.

N79-12253 Illinois Univ. at Urbana-Champaign, Urbana.
EVALUATION OF RELIABILITY OF STEEL BUILDINGS TO WIND LOADINGS Ph.D. Thesis
Kamaluddin B. Rojiani 1978 149 p
Avail: Univ. Microfilms Order No. 7821233

A risk analysis method for structures under wind loading is presented. Risks of exceedance of various safety and serviceability limit states are evaluated at critical sections of the building including for safety, first yielding of beams under flexure; first yielding, instability in the plane of bending and lateral-torsional buckling of columns under combined axial and flexural loads, and for serviceability, exceedance of specified acceleration and deflection levels. On the basis of calculations performed on a 25 story steel frame office building designed in accordance with an existing code it was found that: (1) Uncertainties in dynamic structural properties and the wind environment parameters contribute signficantly to the risk of failure. (2) In the high velocity range failure probabilities for both beams and columns are fairly constant being greater for the beams than for the columns. (3) For lower wind velocities the failure probabilities at the upper levels are significantly greater than at the lower levels. (4) The risk is quite sensitive to the form of the extreme value distribution model used for predicting extreme winds and the distribution (wind climate) parameters. Dissert. Abstr.

N79-12254# Flight Dynamics Research Corp., Van Nuys, Calif.
UNDERWATER JET-DIFFUSER EJECTOR PROPULSION. REAL FLUID EFFECTS Final Report, 1 Apr. 1977 - 31 Jul. 1978
Morton Alperin and Jiunn-Jeng Wu Aug. 1978 95 p refs
(Contract N00014-77-C-0294; RR0240302)
(AD-A058088; FDRC-0294-8-78) Avail: NTIS
HC A05/MF A01 CSCL 13/10

The flow properties and performance of a jet-diffuser and a conventional ejector in an underwater environment, including the influence of losses due to inlet blockage, skin friction, incomplete mixing, diffuser separation and nozzle efficiency have been determined. Analytical methods for the evaluation of the loss coefficients from experiments are described. The importance of a proper selection of pump characteristics to optimize the performance of ejectors of any given geometric size are discussed and some examples of the optimization procedure are presented. The influence of performance limitations due to cavitation, viscous dissipation and self-propulsion are discussed with some specific examples which illustrate these limitations as applied to the performance of ejectors with realistic losses. Author (GRA)

N79-12255# Virginia Univ., Charlottesville. Dept. of Physics.
CRYOGENICS AT THE UNIVERSITY OF VIRGINIA Final Technical Report
Jun. 1978 20 p refs
(Contract N00017-75-C-0845)
(AD-A058269; UVA-PHYS-77-1) Avail: NTIS
HC A02/MF A01 CSCL 20/13

This is the final report on a contract which has provided helium gas for the Liquid Helium Facility at the University of Virginia. The largest use is centered on solid state and low temperature physics research connected with electronic properties of materials, superconductivity, magnetism, electronic devices and liquid helium. In addition a number of instruments operating at liquid helium temperatures are used for a broader range of research in many departments and at the National Radio Astronomy Laboratory. Seventeen faculty members presently use liquid helium as a major part of their research programs and others utilize instruments and cryostats on an available basis for some aspects of their research. GRA

N79-12256# R and D Associates, Marina Del Rey, Calif.
LIQUEFIED NATURAL GAS WIND TUNNEL SIMULATION AND INSTRUMENTATION ASSESSMENTS
Apr. 1978 366 p refs Prepared in cooperation with Colorado State Univ., Fort Collins
(Contract EE-77-C-03-1364)
(SAN-W1364-01) Avail: NTIS HC A16/MF A01

An evaluation of selected aspects of Liquefied Natural Gas (LNG) safety research is presented. Findings are reported on LNG flame radiation data, criteria for test site selection, wind tunnel modeling, wind tunnel tests, instrumentation, and Salton

Sea meteorological data. Recommendations are made for methods of studying LNG vapor dispersion. DOE

N79-12257# National Technical Information Service, Springfield, Va.
INVESTMENT CASTING. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Aug. 1978
William E. Reed Sep. 1978 182 p
(NTIS/PS-78/0982/5) Avail: NTIS HC $28.00/MF $28.00 CSCL 13H

Reports from worldwide research are cited covering foundry practice, patternmaking, automation, equipment, costs, and applications of investment casting. Casting of superalloys, eutectics, maraging steels, cast iron, titanium alloys, and aluminum are included. GRA

N79-12258# National Technical Information Service, Springfield, Va.
FIRE EXTINGUISHING AGENTS. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Aug. 1978
Guy E. Habercom, Jr. Sep. 1978 113 p
(NTIS/PS-78/0988/2) Avail: NTIS HC $28.00/MF $28.00 CSCL 13L

Foams, aqueous films, dry chemicals, fly ash, inert gases, and halogenated compounds are among the agents investigated in the cited reports. Their performance and properties are discussed. Aircraft, building, and coal mine fires are researched for agent application. GRA

N79-12259# Chi Associates, Inc., Arlington, Va.
EXECUTIVE AND TABULAR SUMMARY OF AIR BAG FIELD EXPERIENCE, VOLUME 2, NUMBER 1 Final Report, 1 Sep. 1976 - 30 Aug. 1977
Ann Dalsimer and Lotta Chi May 1978 82 p
(Contract NHTSA-8-0180)
(PB-283956/1; DOT-HS-803416) Avail: NTIS HC A05/MF A01 CSCL 13L

Narrative summaries and tables are presented which describe a total of 92 accidents which were reported to NHTSA during the period September 1, 1976 to August 31, 1977, involving air bag equipped cars. The information was extracted from the NHTSA files containing in-depth reports by the accident investigation teams from the regional research stations. For each case report, the following data are included: date, location of accident, DOT HS number (when available), type of impact, year and make of air bag equipped vehicle, type of accident, cause of air bag deployment, year and make of other vehicles involved, speed of impact and V's (when available), driver and passenger information, their injury codes, damage to the vehicles and damage codes. GRA

N79-12260# Texas A&M Univ., College Station. Center for Dredging Studies.
CHARACTERISTICS OF CORAL AND CORAL DREDGING
B. R. Schlapak and John B. Herbich Jun. 1978 62 p refs
(Grant NOAA-04-6-158-44012)
(PB-285416/4; TAMU-SG-78-207; CDS-213;
NOAA-78071206) Avail: NTIS HC A04/MF A01 CSCL 13C

Eighteen kinds of coral are discussed and illustrated in terms of engineering properties, excavation data, coral reef formation, and world-wide distribution. GRA

N79-12261# Terra Tek, Inc., Salt Lake City, Utah.
FEASIBILITY STUDY OF HYDRO-MECHANICAL BOREHOLE DEVIATION SENSING Final Report, Sep. 1977 - May 1978
F. H. Shipman and C. J. H. BrestVanKempen May 1978 48 p refs
(Contract NSF-C-APR-77-19526)
(PB-284612/9; TR-78-26) Avail: NTIS HC A03/MF A01 CSCL 13B

In answer to the mining industry's need to drill long horizontal holes in rock, a hydro-mechanical borehole guidance concept was developed and tested in the laboratory to limit borehole deviations. The hydro-mechanical borehole deviation sensor uses the drilling fluid as a sensing medium. Preliminary test results using a model of this sensor indicate its straightness measurement sensitivity to be .003 in/ft of penetration. GRA

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N79-12262 Delaware Univ., Newark.
EFFECT OF BOTTOM TOPOGRAPHY ON STABILITY AND WAVE PROPAGATION IN A KELVIN-HELMHOLTZ FLOW Ph.D. Thesis
Anil Mitra 1978 72 p
Avail: Univ. Microfilms Order No. 7818573

A vortex sheet formulation is employed to study the effect of bottom topography on stability and wave propagation in a Kelvin-Helmholtz flow where the lower fluid is at rest and the upper fluid is unbounded and streaming with a uniform velocity. The Kelvin-Helmholtz stability for a wavy bottom is analyzed by a singular perturbation in the bottom amplitude. A plane wave approximation, similar to the WKBJ method, is derived for integral equations with a displacement kernel and a slowly varying parameter. This is applied to the vortex sheet equations. It is concluded that the amplification along a ray of packet of waves depends on the local depth. In a specific example the amplification of a packet of waves is computed as it passes over a depression in the bottom. Dissert. Abstr.

N79-12263 Wesleyan Univ., Middletown, Conn.
THE SCATTERED SPECTRUM OF A MEDIUM CONTAINING TURBULENCE NOISE Ph.D. Thesis
Yu-Faye Chao 1978 120 p
Avail: Univ. Microfilms Order No. 7820171

The spectral distribution of electromagnetic waves scattered by density fluctuations in a homogeneous, isotropic turbulent medium use the time-dependent fluctuating density that is predicted by the hydrodynamical equations. The medium is assumed to be weakly compressible, and the hydrodynamical equations are linearized with respect to the acoustic parameters, but the interaction between the acoustic field and the vortex field is retained. An instantaneous spectrum is evaluated for stationary turbulence at high Reynolds number; and a physical spectrum for nonstationary, evolving turbulence at low Reynolds number. The frequency distribution of the scattered spectra for both cases is found to be similar to that of a quiet fluid; the resonant frequency of both the central component and the Brillouin doublet coincide with those for a quiet fluid. Dissert. Abstr.

N79-12264 City Univ. of New York.
INFRARED DIVERGENCES IN THE S-MATRIX THEORY OF ELECTROMAGNETIC INTERACTIONS Ph.D. Thesis
Spyros Efthimiades 1978 118 p
Avail: Univ. Microfilms Order No. 7821899

A method to calculate all the infrared divergent terms in any order, in the framework of the S-matrix theory of electromagnetic interactions, was devised. Next, the infrared divergent contributions are summed up as an exponential factor that multiplies the non divergent part of the amplitude. Choosing coherent states to represent the incoming and outgoing soft photons, the infrared divergences cancel out. The exponential factor obtained is identical to the results given by Field Theory or by a semiclassical treatment of the problem. The solution to the infrared divergent problem presented renders the S-matrix theory a complete method to calculate electromagnetic scattering amplitudes. Dissert. Abstr.

N79-12265 Auburn Univ., Ala.
AN ADAPTIVE GRADIENT BASED TECHNIQUE FOR ACCELERATING THE CONVERGENCE TIME OF ADAPTIVE ARRAY ANTENNAS Ph.D. Thesis
Dwight Maxwell Jones 1978 79 p
Avail: Univ. Microfilms Order No. 7821540

A significant improvement in the convergence characteristics

of the control loops of the adaptive phased array antenna system was realized by incorporating a technique of adaptive filter initialization into the existing system. The fundamental strength of the technique lies in the fact that the convergence time of the resulting control system is limited primarily by electronic sampling considerations rather than by the natural modes of a feedback control system. Noise bandwidth is the critical factor which determines how closely the initial weights predicted by the technique approach the theoretically optimum values. A phase analysis of the first order control loops of Applebaum shows that in the monochromatic case the phases on the various lines in the control loops remain constant during the convergence period. The result suggests that the phase information for each steering weight permutation may be obtained from a single sample of the instantaneous inputs to the low pass filters.
Dissert. Abstr.

N79-12266 Washington Univ., Seattle.
CALCULATION OF COMPLEX MODES AND ANALYSIS OF TAPERED COUPLING IN OPTICAL WAVEGUIDES Ph.D. Thesis
Robert Brubaker Smith 1978 365 p
Avail: Univ. Microfilms Order No. 7820773

Analytic solutions are obtained for the tapered coupler. Analytic solutions are found for the mode amplitudes in two waveguides, which have, in the context of coupled mode theory, a constant coupling coefficient and propagation coefficients which vary linearly along the coupler. The solutions are expressed in terms of the parabolic cylinder functions E(a,x) and E*(a,x). Asymptotically, toward the end of the coupler, the solutions reduce to simpler forms in terms of elementary functions. These lead to a simple exact expression for the coupler efficiency, and also to a quantitative criteria for the necessary coupler length. The results provide a basis for the design of tapered couplers which is quantitative and objective. Dissert. Abstr.

N79-12267*# ECON, Inc., Princeton, N. J.
PRELIMINARY BENEFITS STUDY FOR A PUBLIC SERVICE COMMUNICATIONS SATELLITE SYSTEM: TASK ORDER 2 Final Report
6 Oct. 1978 260 p
(Contract NASw-3047)
(NASA-CR-157946; ECON-78-293-1) Avail: NTIS HC A12/MF A01 CSCL 17B

The economic and social benefits to accrue from an operational public service communications satellite system are estimated for the following applications: teleradiology, emergency medical services, teleconferencing for both civilian and defense agencies, data transfer, remote cardiac monitoring, teleconsultation, continuing education for professionals, and severe storm warning. The potential impact of improved communication on the cost and quality of services are assessed for various agencies, professions, and industries. A.R.H.

N79-12268*# Arkansas Univ., Fayetteville.
SIGNIFICANCE OF DUAL POLARIZED LONG WAVELENGTH RADAR FOR TERRAIN ANALYSIS
H. C. MacDonald and W. P. Waite Oct. 1978 19 p refs Prepared for JPL
(Contracts NAS7-100; JPL-954940)
(NASA-CR-157947) Avail: NTIS HC A02/MF A01 CSCL 17I

Long wavelength systems with improved penetration capability have been considered to have the potential for minimizing the vegetation contribution and enhancing the surface return variations. L-band imagery of the Arkansas geologic test site provides confirmatory evidence of this effect. However, the increased wavelength increases the sensitivity to larger scale structure at relatively small incidence angles. The regularity of agricultural and urban scenes provides large components in the low frequency-large scale portion of the roughness spectrum that are highly sensitive to orientation. The addition of a cross polarized channel is shown to enable the interpreter to distinguish vegetation and orientational perturbations in the surface return. L.S.

N79-12269# Communications Research Centre, Ottawa (Ontario). Space Technology and Applications Branch.
HERMES DAMA EXPERIMENT
R. J. Campbell Jun. 1978 24 p refs
(CRC-1309) Avail: NTIS HC A02/MF A01

An experimental demand assignment multiple access system was demonstrated using the communications satellite HERMES (formerly CTS, the joint U.S./Canadian Communications Technology Satellite). The satellite was operated in a single-channel-per-carrier, frequency-division multiple-access (SCPC/FDMA), double-hop mode. The DAMA system utilized central control with a random access request channel and was interfaced to the switched telephone network. Author

N79-12270# Communications Research Centre, Ottawa (Ontario).
CANADIAN AERONAUTICAL SATELLITE TESTS USING THE ATS-6 SATELLITE, JANUARY 1976
J. H. Chinnick and D. Burtt Aug. 1978 28 p ref
(CRC-TN-693) Avail: NTIS HC A03/MF A01

The ATS-6 satellite was used to compare the performance of several voice modulation techniques and two antenna systems installed in an airborne terminal. For these tests, improved versions of a voice modulation technique based on a delta encoding/PSK modulation and a technique based upon the transmission of the PSK modulated zero-crossing transitions of the audio signal were tested against a reference narrowband frequency modulation system under varying conditions of carrier-to-noise density ratio and carrier-to-diffuse multipath ratio. The delta and zero-crossing encoding units proved to be very reliable and yielded exceptionally good intelligibility scores. The aircraft antenna system included a nine-element linear phased array mounted on the top centerline of the aircraft and two cavity-backed slot dipole antennas mounted on the shoulders of the aircraft. A significant improvement over previous testing was the incorporation of an automatic beam steering unit which worked in conjunction with an onboard inertial navigation system. G.G.

N79-12271*# Texas A&M Univ., College Station. Remote Sensing Center.
IMPROVEMENTS AND MODIFICATIONS TO THE NASA MICROWAVE SIGNATURE ACQUISITION SYSTEM Final Report
B. R. Jean, R. W. Newton, G. L. Warren, B. V. Clark, and J. L. Zajicek May 1978 63 p refs
(Contract NAS9-14817)
(NASA-CR-151851; RSC-3308-5) Avail: NTIS HC A04/MF A01 CSCL 17B

A user oriented description of the modified and upgraded Microwave Signature Acquisition System is provided. The present configuration of the sensor system and its operating characteristics are documented and a step-by-step operating procedure provides instruction for mounting the antenna truss assembly, readying the system for data acquisition, and for controlling the system during the data collection sequence. The resulting data products are also identified. G.Y.

N79-12272# Lincoln Lab., Mass. Inst. of Tech., Lexington.
UPLINK ATCRBS ENVIRONMENT MEASUREMENTS ALONG THE BOSTON-WASHINGTON CORRIDOR. VOLUME 1: THE RF ENVIRONMENT
Ferenc Nagy, Jr. 27 Jun. 1978 25 p
(Contract DOT-FA71WAI-242; F19628-78-C-0002; FAA Proj. 052-241-04)
(AD-A058654; ATC-38-Vol-1; FAA-RD-78-33) Avail: NTIS HC A02/MF A01 CSCL 17/9

Airborne measurements of the Air Traffic Control Radar Beacon System (ATCRBS) 1030 MHz uplink environment due to ATC ground interrogators are described. The measurements were made using a special purpose airborne sensor-recorder during a flight from Boston to Washington (at 8500 feet) and back (at 17,500 feet) on 16 December 1977. Data were recorded at 24 locations between Boston and Washington and processed to obtain distributions of pulse, interrogation, and suppression rates with received power. The most numerous contributors to the uplink pulse environment are omnidirectionally radiated suppression pulses. The overall average suppression rate is approximately 600 per second. The suppression rate is relatively independent of altitude but there are wide variations in the suppression rate from one location to another. Interrogation rates increase with altitude but do not vary significantly from location

to location except near interrogators without sidelobe suppression. The overall average rate of receipt of Mode A plus Mode C interrogations is approximately 75 per second at an altitude of 8500 feet and 100 per second at an altitude of 17,500 feet.
Author

N79-12273*# Fairchild Space and Electronics Co., Germantown, Md.
COMMUNICATIONS SYSTEMS TECHNOLOGY ASSESSMENT STUDY. VOLUME 2: RESULTS Final Report
R. L. Kelley, R. K. Khatri, J. D. Kiesling, and J. A. Weiss Oct. 1977 352 p
(Contract NAS3-20364)
(NASA-CR-135224) Avail: NTIS HC A16/MF A01 CSCL 17B

The cost and technology characteristics are examined for providing special satellite services at UHF, 2.5 GHz, and 14/12 GHz. Considered are primarily health, educational, informational and emergency disaster type services. The total cost of each configuration including space segment, earth station, installation operation and maintenance was optimized to reduce the user's total annual cost and establish preferred equipment performance parameters. Technology expected to be available between now and 1985 is identified and comparisons made between selected alternatives. A key element of the study is a survey of earth station equipment updating past work in the field, providing new insight into technology, and evaluating production and test methods that can reduce costs in large production runs. Various satellite configurations were examined. The cost impact of rain attenuation at Ku-band was evaluated. The factors affecting the ultimate capacity achievable with the available orbital arc and available bandwidth were analyzed. G.G.

N79-12274# Federal Aviation Administration, Washington, D. C. Systems Research and Development Service.
FALSE DISCRETE TARGETS IN THE EN ROUTE SYSTEM Final Report
James A. Shannon Jun. 1978 119 p
(AD-A058996; FAA-RD-78-72) Avail: NTIS HC A06/MF A01 CSCL 17/7

False target rates from selected secondary radar sites in the en route system are given. Six candidate fixes which attack the problems associated with these rates were examined. False reports were divided into ringaround, splits, and reflections. A false report not classified as a ringaround or a split was classified as a reflection. Several fixes against the ringaround type of false target were available and one of them, based on the double coverage provided in the en route system, was recommended for implementation. A fix against the split type of false target report was available and consideration of implementation was recommended. A fix against the reflection type of false target was recommended in the special case where the physical reflector could be identified. J.A.M.

N79-12275# National Aviation Facilities Experimental Center, Atlantic City, N. J.
INTERFERENCE IN COMMUNICATIONS AND NAVIGATION AVIONICS FROM COMMERCIAL FM STATIONS Final Report, Dec. 1976 - Nov. 1977
Edward M. Sawtelle and James G. Dong Jul. 1978 275 p
(AD-A058903; FAA-RD-78-35; FAA-NA-77-44) Avail: NTIS HC A12/MF A01 CSCL 20/14

The effects of commercial frequency modulation (FM) broadcast stations on communications and navigation avionics were investigated employing several classes of avionics receivers. Flight tests were completed, employing site frequencies with intermodulation interference determined by a computer program calling for possible intermodulation products in selected midwestern and southern states. Laboratory measurements were accomplished on the receivers and antenna pattern measurements of typical aircraft antennas were obtained to determine the areas that improvements can best be applied to alleviate the FM interference problem. Results indicated that a 10 dB increase in rejection of FM signals in avionic receivers, would eliminate most FM interferences. A method was proposed, utilizing the Venn diagram approach for predicting possible FM interference assignments under consideration. Author

N79-12276# European Space Agency, Paris (France).
ANTENNA TESTING TECHNIQUES
May 1977 171 p refs Partly in ENGLISH and partly in FRENCH Proc. of Workshop held at ESTEC, Noordwijk, Neth., 6-8 Jun. 1977
(ESA-SP-127-Preprint) Avail: NTIS HC A08/MF A01

Papers presented at a workshop held by ESTEC are discussed. They give a review of the state-of-the-art of satellite antenna testing (with focus on European satellite projects) and a presentation of recent progress in the development of alternative test techniques based on near-field sampling with numerical transformation to the far field. For individual titles, see N79-12277 through N79-12300.

N79-12277# GEC-Marconi Electronics Ltd., Chelmsford (England).
PRINCIPLES OF ANTENNA MEASUREMENTS USING ON-LINE COMPUTER PROCESSING WITH SPHERICAL PROBING
P. J. Wood *In* ESA Antenna Testing Tech. May 1977 p 3-8 refs (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

Special features of the Marots shaped beam reflector system and its characterization at L, X, and J band dictate the generation of pattern data in digital form and the use of an on-line computer. The near field technique being best suited to a digital data format, with computer processing, the principles of near field spherical probing, the selection of the most suitable analytical approach, and a detailed mathematical formulation using a spherical wave expansion are discussed. ESA

N79-12278# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
THE SEMI-OPEN ANECHOIC CHAMBER OF THE MBB ANTENNA TEST FACILITY
K. A. Koob and B. H. C. Liesenkoetter *In* ESA Antenna Testing Tech. May 1977 p 9-13 refs (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

The MBB antenna test facility designed for measurements on aerospace antennas tested either on full scale or scaled down models is described. The heart of the main test range is the anechoic chamber with inner dimensions of 8.8 m x 8.6 m x 8.3 m. There measurements can be made in the frequency range of about 120 MHz to 30 GHz. A thin dielectric awning, transparent for electromagnetic waves, closes the chamber at one side. With this semi-open anechoic chamber both requirements can be met: measurements on aerospace systems without dependence on weather conditions, and higher measuring distances than in closed anechoic chambers; the distance can be chosen up to 80 m, in special cases even more. Measurement results are recorded on punched-tape and computer evaluated when required.
Author (ESA)

N79-12279# Hawker Siddeley Dynamics Ltd., Stevenage (England).
DESIGN AND EVALUATION OF THE RF ANECHOIC CHAMBER AT HSD
D. Draper and Z. F. Voyner *In* ESA Antenna Testing Tech. May 1977 p 15-20 refs (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

Work carried out during various stages of design, construction, and evaluation of RF screened, anechoic 18.3 x 7.3 x 7.3 m rectangular chamber at HSD Stevenage is described. Results are presented of the reflectivity for the 3 cu m and 3 x 2.5 x 2.5 m volumes of the quiet zone. The design of this RF anechoic facility followed four distinct phases of experimental work, during which three different distributions of the anechoic material were investigated, together with the 1/6th scale physical modelling. The optimum configuration finally selected consists of a uniform distribution of 0.9 m pyramids on two sides, floor and ceiling, and 1.8 m material on the two end walls. At the end remote from the quiet zone there is an additional 4.3 m wide band of absorbing material backing onto the uniform pyramids. The feature of this facility is the relatively good performance over a 3 cu m quiet zone at low frequencies.
Author (ESA)

N79-12280# Thomson-CSF, Bagneux (France). DRS Div.
PERFORMANCE OF GROUND STATION OPERATIONS [PERFORMANCES D'UNE STATION TERRIENNE]
B. Daveau *In* ESA Antenna Testing Tech. May 1977 p 21-26 In FRENCH (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

The near field technique was applied to the study of the performance of a ground station 4 -reflector Cassegrainian antenna feed to be used for space communication in the 11 to 14 GHz range. The subsystem, consisting of a corrugated horn and the four reflectors of the feed system, was installed in an anechoic chamber. Using field phase and amplitude profiles the radiation and illumination of the main reflector as well as its far field patterns were determined. This was achieved by automatic control and processing using a minicomputer. ESA

N79-12281# Selenia S.p.A., Rome (Italy). Antenna Dept.
SELENIA ANTENNA TEST FACILITIES
Benito Palumbo *In* ESA Antenna Testing Tech. May 1977 p 27-36 refs (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

After a short survey on various conventional test sites, a controlled area anechoic chamber is presented. Some special testing devices are described, such as a thermal chamber for radiative tests on antennas at various temperatures. The advantages of computer controlled systems for automatic antenna testing and measured data processing were examined and one of these systems is presented. Future developments are outlined, with particular reference to automatic test techniques.
Author (ESA)

N79-12282# Technical Univ. of Denmark, Lyngby. Inst. of Electromagnetics.
THE RADIO ANECHOIC CHAMBER OF THE TECHNICAL UNIVERSITY OF DENMARK AND ITS EVALUATION
Joergen Appel-Hansen *In* ESA Antenna Testing Tech. May 1977 p 37-43 refs (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

The main features of the radio anechoic chamber are described with emphasis on the measurement procedure and analysis of results for a detailed evaluation of the chamber for antenna pattern measurements. The evaluation, using the free-space VSWR technique, gives a figure of merit called the reflectivity level which is a measure of reflected energy relative to direct transmitted energy. The reflectivity level indicates the accuracy with which antenna pattern measurements can be recorded. Author (ESA)

N79-12283# Scientific-Atlanta, Inc., Atlanta, Ga.
CONTEMPORARY INSTRUMENTATION FOR ANTENNA MEASUREMENTS
Doren W. Hess *In* ESA Antenna Testing Tech. May 1977 p 45-51 (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

Current and future developments in antenna test instrumentation are reviewed. The trends toward automatic testing and the use of near-field techniques are discussed. Specific attention is given to a minicomputer-based automatic antenna test instrument, a programmable microwave receiver, a compact antenna range, and a planar near-field scanning system. Author (ESA)

N79-12284# Electrical Research Association, Leatherhead (England).
ANTENNA RADIATION MEASUREMENTS AT ERA'S RF TECHNOLOGY CENTRE
A. W. Rudge *In* ESA Antenna Testing Tech. May 1977 p 53-56 ref (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

The antenna test facilities are described. The techniques adopted for the evaluation of the antenna range are discussed and some examples of typical experimental data are provided. The antenna range facilities are presently being extended in order to provide improved coverage in the 8 to 40 GHz range and improved handling capabilities for larger structures. ESA

N79-12285# Selenia S.p.A., Rome (Italy).
THE OTS ANTENNA MEASUREMENTS ACTIVITIES
G. Doro, F. Filippi, and A. Saitto *In* ESA Antenna Testing Tech. May 1977 p 59-68 refs (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

The Orbital Test Satellite (OTS) uses antennas with two channels for frequency reuse by means of polarization discrimination in the 11 GHz for transmitting and 14 GHz for receiving. The antennas will be both in dual linear and in dual circular polarization. Main requirements for the antennas are efficiency and polarization purity. Furthermore, the pointing of the antenna boresight has to be known with great accuracy. The test range set up for the OTS antennas is discussed and the results obtained are presented. The measurement activities are described for co/cross pattern, gain, and pointing, together with the achieved accuracy. Future improvements of test range and test methods are suggested. Author (ESA)

N79-12286# GEC-Marconi Electronics Ltd., Chelmsford (England).
THE MAROTS ANTENNA MEASUREMENT FACILITY
P. J. Wood *In* ESA Antenna Testing Tech. May 1977 p 69-76 refs (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

The test range for the development and flight standard antennas for the Marots communication satellite is described. This facility is a 107 m quasi-far field range with online computer processing. Some of the methods used to calibrate, align, and validate the range are briefly described. A special experiment verified the predicted measurement accuracy. Author (ESA)

N79-12287# Royal Aircraft Establishment, Farnborough (England).
MEASUREMENT TECHNIQUES FOR SATELLITE VHF TELEMETRY ANTENNAS
R. W. Hogg *In* ESA Antenna Testing Tech. May 1977 p 77-83 (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

An illustrated description is given of the range developed by the RAE, Farnborough, for low gain antenna testing. The 12 m pole retracts vertically into a hole so that loading and adjustments can be carried out at ground level; it has full rotational capability at any intermediate height and is thought to be unique. The way in which the range is set up for satellite testing of VHF circularly polarized omnidirectional antenna systems is explained. Results of an independent check with patterns computed by the Technical University of Denmark are given.
Author (ESA)

N79-12288# Telefonaktiebolaget L. M. Ericsson, Moelndal (Sweden). MI Div.
THE MAM PHASED ARRAY ANTENNA MEASUREMENT AND EVALUATION METHOD
A. Andersson and A. Molker *In* ESA Antenna Testing Tech. May 1977 p 85-88 refs (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

An evaluation method for phased array antennas is described, by which active element performance is measured and the array performance simulated in a computer program with the measurements as input. The measurements are made on a computer controlled test range and the results are fed into a large computer via punched paper tape. The simulation program can treat any planar array arrangement with up to 50 elements and generating 20 beams. Author (ESA)

N79-12289# Societe Nationale Industrielle Aerospatiale, Paris (France).
DESCRIPTION AND PERFORMANCE OF THE METEOSAT ANTENNA CHECKOUT EQUIPMENT
J. P. Boisset and J. F. Coroller *In* ESA Antenna Testing Tech. May 1977 p 89-93 (For primary document see N79-12276 03-32)
(Contract ESA-2096/73-CG)
Avail: NTIS HC A08/MF A01

Based on the reproducibility of near field measurements and the near field/far field transformation, the system permits the detection of electronically despun antenna failures and the evaluation of gain degradations. Author (ESA)

N79-12290# Selenia S.p.A., Rome (Italy).
METEOSAT: DESCRIPTION AND PERFORMANCES OF THE AUTOMATIC ANTENNA TEST RANGE IMPLEMENTED FOR THE EDA
Ciro Nicolai and Roberto Evangelisti *In* ESA Antenna Testing Tech. May 1977 p 95-101 ref (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

The electronic despun antenna for the Meteosat satellite and its relative testing system are described briefly. The selection criteria of the measured system are presented. The implemented test system is described and its applications to the Meteosat Program presented. The measured results are shown and the relative accuracies are evaluated. Author (ESA)

N79-12291# Telefonaktiebolaget L. M. Ericsson, Moelndal (Sweden). MI Div.
EXPERIENCE FROM EVALUATION OF S-BAND ANTENNAS FOR ISEE-B AND GEOS
Per Ingvarson and Erik Roland Karlsson *In* ESA Antenna Testing Tech. May 1977 p 103-106 (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

The far field range length criterion for the S/C's with short booms requires a range of about 200 m. Such a long range causes severe reflections from the surroundings. Therefore, a much shorter range must be used and the resulting errors assessed with calculations. Test range setup and performance, and specific problems for the different antennas are discussed namely the GEOS S-band antenna, the ISEE-B S-band antennas (toroidal coverage antenna), and quasi-isotropic coverage antenna. The S-band antenna system to be used on the Exosat satellite will be directional. The design work on these antennas has started, and it is planned to perform pattern and gain measurements on the same type of range as used for ISEE-B. Author (ESA)

N79-12292# Technical Univ. of Denmark, Lyngby. Inst. of Electromagnetics.
NEAR-FIELD/FAR-FIELD ANTENNA TEST TECHNIQUES: GENERAL PRESENTATION OF CONCEPTS
J. E. Hansen *In* ESA Antenna Testing Tech. May 1977 p 109-114 refs (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

The method of obtaining antenna far field patterns from near field measurement on planes and cylinders is presented.
ESA

N79-12293# National Bureau of Standards, Boulder, Colo.
ADVANTAGES AND DISADVANTAGES OF PLANAR, CIRCULAR CYLINDRICAL, AND SPHERICAL SCANNING AND DESCRIPTION OF THE NBS ANTENNA SCANNING FACILITIES
Paul F. Wacker and Allen C. Newell *In* ESA Antenna Testing Tech. May 1977 p 115-121 refs Sponsored in part by AFAL, Wright-Patterson AFB (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

Near field scanning yields high accuracy because of laboratory-type control, fitting with linear combinations of exact solutions of Maxwell's equations, high signal to noise ratio, averaging over 10000 or more measurements for each pattern value, full correction for proximity effects, and absence of ground and grazing angle reflections, as in an anechoic chamber. Further, it provides quite detailed pattern information, and it can yield phase and amplitude of each component of the electromagnetic six-vector for any distance, permitting computation of cosite interference. Not only is it independent of weather, it permits measurements to be made in a clean room and in atmospheric absorption bands. Planar, circular cylindrical, and spherical scanning are compared, and the NBS near field scanning facilities are described, including new circular cylindrical and spherical facilities.
Author (ESA)

N79-12294# Technical Univ. of Denmark, Lyngby. Inst. of Electromagnetics.
PROBE CORRECTION OF SPHERICAL NEAR-FIELD MEASUREMENTS OF A SATELLITE MODEL
Flemming Holm Larsen *In* ESA Antenna Testing Tech. May 1977 p 123-128 refs (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

Spherical near field measurements are foreseen to be used for the testing of satellite antennas. The near field of a satellite model was measured in the radio anechoic chamber at the Technical University of Denmark, and the far field was calculated without correction for the size and directivity of the probe antenna. The inclusion of probe correction in the data processing and testing of the computer program is described. It is concluded that the method works when the distance between the test antenna and the probe is kept larger than two wavelengths. The probe correction was shown to improve the accuracy of the calculated far field of the satellite model. Author (ESA)

N79-12295# Queen Mary Coll., London (England).
THE PRACTICAL PERFORMANCE OF COMPACT ANTENNA RANGES
A. D. Olver *In* ESA Antenna Testing Tech. May 1977 p 129-133 refs (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

The principles of compact antenna test ranges are presented. The main factors which determine the performance are considered. These include diffraction from the reflector edge, reflector surface accuracy, the feed radiation pattern, and the focal length of the reflector. Practical performance was investigated with a compact range constructed using a three meter diameter paraboloidal reflector. The diffraction off the edge of this reflector was controlled by serating the edge. The range was successfully used to measure antennas up to 1.2 m diameter at frequencies from 3 GHz to 40 GHz. Author (ESA)

N79-12296# Sheffield Univ. (England). Dept. of Electronic and Electrical Engineering.
NEAR-FIELD/FAR-FIELD TRANSFORMATION USING A PLANE WAVE SYNTHESIS TECHNIQUE
J. C. Bennett and E. P. Schoessow *In* ESA Antenna Testing Tech. May 1977 p 135-136 (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

A plane-wave synthesis technique is presented as an alternative approach to near field/far field transformation. The method allows prediction over all space and requires only a simple mathematical routine for its implementation. Experimental results are provided as verification of the process. Author (ESA)

N79-12297# European Space Research and Technology Center, Noordwijk (Netherlands).
AN INTERFERENCE PATTERN INTERMEDIATE DISTANCE ANTENNA MEASUREMENT METHOD
K. M. Keen *In* ESA Antenna Testing Tech. May 1977 p 137-141 refs (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

A new antenna pattern measurement technique for antennas with large far field distances is described. The method, the essence of which is phase extraction from interference patterns, is applicable to conventional ranges with two axis positioners and amplitude only receivers. It requires only a few minor items of additional equipment. The philosophy behind the method is that antennas not amenable to conventional far field measurement techniques are comparatively rare, and therefore, the construction of special facilities for these cases is, in normal circumstances, counter cost effective. A better solution is to have some method whereby both phase and amplitude can be monitored at an intermediate distance on a conventional range, then to use data processing to get the far field patterns.
Author (ESA)

N79-12298*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
PROBE CORRECTED FAR-FIELD RECONSTRUCTION FROM MEASUREMENTS ON A CYLINDER: A NOVEL FORMULATION AND EFFICIENT ALGORITHM
Giorgio V. Borgiotti *In* ESA Antenna Testing Tech. May 1977 p 143-149 refs (For primary document see N79-12276 03-32) (Contract NAS7-100)
Avail: NTIS HC A08/MF A01

A novel and numerically efficient method of far field evaluation from measurements taken on a cylinder is based on the

representation of both the antenna and the probe fields as superpositions of plane waves. A system of two integral equations are established whose unknown functions are the azimuthal and elevation components of the antenna pattern and whose known terms are the set of measurement data taken with two different probes - the second probe in most practical instances being simply the same probe with a different geometrical orientation. The equations express the known data - for each angular position of the antenna under measurement - as the integrals of the products of the corresponding components of the unknown antenna and known probe patterns multiplied by a phase term. The convolutional nature of the integral equations makes their solutions straight-forward. If, as is virtually always the case, the probe is small or of moderate size so that the axis of rotation of the antenna mount is in the far field of the probe, the intervention of asymptotic techniques makes the solution numerically very efficient. The agreement of calculated and experimental patterns is excellent. Author (ESA)

N79-12299# Ticra A/S, Lyngby (Denmark).
THE SPHERICAL NEAR-FIELD FAR-FIELD TECHNIQUE AND ITS APPLICATION TO SATELLITE ANTENNAS
Frank Jensen *In* ESA Antenna Testing Tech. May 1977 p 151-158 refs (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

The spherical near-field technique (SNFT) has recently been implemented and tested in the Radio Anechoic Chamber at the Technical University of Denmark. The technique was demonstrated for a cylindrical satellite model with and without solar panels. The near and far fields were measured, and the predicted and the measured far fields were compared. The main results presented are: it is possible by SNFT to predict far fields with an accuracy the same or even better than by direct far-field measurements; the highest degree, N, of the modes required in the expansions of the field is traditionally stated to be 2 pi r sub o / lambda where r sub o / lambda is the radius (in terms of wavelengths) of the smallest sphere surrounding the test antenna. It has been demonstrated that for certain applications a much smaller number of modes are sufficient; and it is possibile to truncate the measurement surface - not only to the region of high field intensity but, roughly, to the region of interest. Author (ESA)

N79-12300# National Bureau of Standards, Boulder, Colo.
RECENT RESULTS WITH SPHERICAL NEAR-FIELD ANTENNA SCANNING AT THE NATIONAL BUREAU OF STANDARDS
Paul F. Wacker *In* ESA Antenna Testing Tech. May 1977 p 159-164 refs Sponsored in part by AFAL, Wright-Patterson AFB (For primary document see N79-12276 03-32)
Avail: NTIS HC A08/MF A01

The author's Fast Fourier Transform multiplying matrix technique of processing near-field spherical scanning data was programmed for the no-probe-correction case, except for the complicated translational transformation of the probe pattern coefficients. (The elements of the multiplying matrices are constants independent of the angular and radial positions of the measurement points.) For an X-band antenna 23 wavelengths across with half-widths of 1.5 to 1.8 deg, computations were carried out in 2 min. For a scanning radius R = 329.2 cm, the far field is in good agreement with that accurately known from planar scanning. For R = 50.9 cm, the agreement is less good, apparently due to lack of a probe correction. For delta theta x delta phi = 2 deg x 6 deg there is a small aliasing error at the larger radius, but essentially none at the smaller. Translation of the phi axis 0.36 lambda from intersection with the theta axis produced only moderate errors. Author (ESA)

N79-12301# Environmental Research Inst. of Michigan, Ann Arbor. Radar and Optics Div.
EFFECTS OF ATMOSPHERIC TURBULENCE ON SAR PERFORMANCE Final Technical Report, Feb. - Aug. 1977
G. Adams, R. Crane, and J. Auterman Jun. 1978 98 p refs
(Contract F33657-77-C-0229)
(AD-A057980; ERIM-127800-5-F) Avail: NTIS HC A05/MF A01 CSCL 20/14

A study was carried out to assess the effects of atmospheric turbulence upon synthetic aperture radar (SAR) imagery. A model, based upon turbulence theory, was developed to predict the expected SAR impulse response as a function of a parameter denoted the SAR atmospheric phase error coefficient, K sub phi. This coefficient may be calculated from measured index of refraction profiles and radar geometry. The expected SAR responses was evaluated as a function of the coefficient K sub phi for four separate rada. image processor configurations; unweighted aperture, unweighted corrected focus aperture, cosine squared weighted aperture, and 30 dB Taylor weighted aperture. Results are presented in the report. The measurements indicate that atmospheric turbulence is not expected to seriously degrade the performance of currently operational systems or those operating at significantly longer ranges or finer resolutions. The measurements were limited in time, quantity, climatic conditions, and geographic locations. Extensive quantitative results will depend upon further experimental measurements. GRA

N79-12302# Singer Co., Sunnyvale, Calif. Link Div.
PROJECT 1183 ENGINEERING TECHNICAL REPORT Final Report, 27 Oct. 1973 - 3 Oct. 1977
Jun. 1978 69 p
(Contract F33657-73-C-0692)
(AD-A058055) Avail: NTIS HC A04/MF A01 CSCL 17/9

Project 1183 was designed as an engineering development model to demonstrate the effectiveness of digital radar landmass simulation and to establish a technological baseline from which future high resolution Digital Radar Landmass Simulators (DRLMS) can be developed. Among the goals of this project were: to demonstrate the feasibility of high resolution radar landmass simulation; to develop, concurrently, a digital data base; to be an engineering test bed for the development of specifications for future Air Force radar simulators; and to gather data about interfacing a DRLMS to an existing mission simulator. GRA

N79-12303# Raytheon Co., Bedford, Mass. Missile Systems Div.
DETERMINATION OF RADAR PERFORMANCE DEGRADATION DUE TO TROPOSPHERIC DUCTS Final Technical Report, 20 Apr. - 31 Oct. 1977
G. H. Joshi May 1978 155 p refs
(Contract F19628-77-C-0145)
(AD-A058110; BR-10101; RADC-TR-78-69) Avail: NTIS HC A08/MF A01 CSCL 17/9

Wave propagation for anomalous meteorological conditions around Canton Island is studied by pursuing the geometrical optics and the physical optics approaches. The relative merits along with the limitations of these two approaches have been established. For ranges beyond line of sight the physical optics approach is applied to the bilinear and the tri-linear refractive index profiles. The numerical analysis to determine the real eigenvalues and the height gain functions has been carried out for the bilinear refractive index profile. This numerical analysis has been carried out for four bilinear refractive index profiles and three wavelengths. Author (GRA)

N79-12304# Rome Air Development Center, Griffiss AFB, N.Y.
BASIC INVESTIGATIONS OF THE RADAM EFFECT
Ronald G. Newburgh Jun. 1978 13 p refs
(AD-A058099; RADC-TR-78-151) Avail: NTIS HC A02/MF A01 CSCL 17/9

This report summarizes the basic investigations of the RADAM effect (the radar detection of agitated metals) for the Air Force. The work reported was done by the Rome Air Development Center (Electromagnetic Sciences Division), the Polytechnic Institute of New York, and the Stanford Research Institute. AFOSR supervised the contractural work. The three main causes of the effect are subsystem motion, structural vibrations, and junction effects. The phenomena have been classified and are understood in terms of basic physical processes.
Author (GRA)

N79-12305# Army Communications Research and Development Command, Fort Monmouth, N. J.
ATACS EQUIPMENTS. INTEROPERATION, BLOCK DIAGRAMS AND ABBREVIATED DESCRIPTIONS
Giustino G. Baiano and Curtis Q. Murphy May 1978 33 p
(AD-A058094; CORADCOM-78-2) Avail: NTIS HC A03/MF A01 CSCL 17/2

This report summarizes and presents the primary system

interface parameters of ATACS equipments, and shows the required interconnections among them. Included are annotated block diagrams, bit rates, frequencies, number of channels, power levels, antenna sizes, and details of the cable system. The present PCM voice system is discussed, and its expansion to the high data rate (32 kb/s) system by use of the TD-1069 and TD-1065 explained. Author (GRA)

N79-12306# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.

URLIM: A UNIFIED RADOME LIMITATIONS COMPUTER PROGRAM. VOLUME 2: USER'S GUIDE

R. K. Frazer Apr. 1978 219 p

(Contract N00017-72-C-4401)

(AD-A057459; APL/JHU/TG-1293B-Vol-2) Avail: NTIS HC A10/MF A01 CSCL 17/9

URLIM, a unified radome limitations computer program has been developed to aid the radome design engineer by providing a definition of the maximum flight performance capabilities of radome materials. URLIM numerically determines the response of the radome to aerodynamic heating and loading. It computes the following as functions of trajectory time: thermal stress; radar boresight error slopes; missile-radome attachment stresses caused by maneuvers, pressure, and drag forces; and the onset of melting. The basic output of the program is a notation of trajectory time at which the radome reaches its design limitations. Many options are available to the user of the URLIM program that provide a wide variety of analysis capability. For this reason URLIM may also be considered as a general purpose aerodynamic heat transfer program as well as a specific purpose radome limitations program. Volume 1 of this report presents the theoretical background of the analysis techniques used in URLIM; Volume 2 provides a detailed explanation of how to use URLIM. Author (GRA)

N79-12307# Syracuse Univ., N. Y. Dept. of Electrical and Computer Engineering.

COMPUTER PROGRAMS FOR COUPLING IN A FINITE PLANAR RECTANGULAR WAVEGUIDE ANTENNA ARRAY

John Luzwick and Roger F. Harrington Jul. 1978 53 p refs

(Contract N00014-76-C-0225)

(AD-A057964; TR-78-8) Avail: NTIS HC A04/MF A01 CSCL 09/5

A computer program is given to implement the equations derived in Technical Report TR-78-7, Mutual Coupling in a Finite Planar Rectangular Waveguide Antenna Array. The aperture dimensions can be less than or equal to the feeding waveguide dimensions. Three specific uniformly spaced array lattices are considered - linear, rectangular, and isosceles triangular. For the linear and rectangular lattice cases, the Toeplitz symmetry property of the admittance matrix is utilized to save storage space and computation time. The program consists of a main program and several subroutines which calculate both the half-space admittance and scattering matrices. The computer program is described and listed, along with sample input-output data. Author (GRA)

N79-12308# Army Research Inst. for the Behavioral and Social Sciences, Alexandria, Va.

COMPREHENSION OF TIME-COMPRESSED SPEECH AS A FUNCTION OF TRAINING

Joseph V. Lambert, Joyce L. Shields, Paul A. Gade, and J. Douglas Dressel Jun. 1978 31 p refs

(DA Proj. 2Q7-62717A723)

(AD-A058204; ARI-TP-295) Avail: NTIS HC A03/MF A01 CSCL 05/9

This experiment studied five training methods for effective listening of time-compressed speech. Army subjects trained by two methods using incentives understood speech played 2.2 times faster than normal without degradation of performance. Subjects trained by three methods not using incentives had significantly degraded performance when compressed speech was presented at rates faster than 1.85 times the normal rate. Author (GRA)

N79-12309# Lincoln Lab., Mass. Inst. of Tech., Lexington.

DESIGN, FABRICATION AND EVALUATION OF AN L-BAND CYLINDRICAL ARRAY

Kimball J. Keeping and Jean-Claude Sureau 10 May 1978 47 p refs

(Contract F19628-78-C-0002)

(AD-A058032; TST-21; ESD-TR-78-84) Avail: NTIS HC A03/MF A01 CSCL 09/5

An L-band cylindrical array has been assembled for demonstration purposes. The array is 6 ft in diameter and contains 48 4-ft columns. It was fabricated using novel, low-cost and lightweight techniques. Measurements indicate that this array is usable at least from 1.0 to 1.4 GHz. Plans for implementing the scanning matrix and other design options are indicated. Author (GRA)

N79-12310# California Univ., Berkeley. Electronics Research Lab.

APPLICATIONS OF ANALOG SAMPLED DATA SIGNAL PROCESSING TO LOW-COST SPEECH BANDWIDTH COMPRESSION Semi-Annual Report, 1 Mar. 1978

R. W. Brodersen 1978 11 p refs

(Contract N00173-77-C-0235; ARPA Order 3424)

(AD-A058225) Avail: NTIS HC A02/MF A01 CSCL 09/3

The basic objective of this contract is to apply MOS-LSI techniques to the problem of narrow band vocoding. In particular, analog sampled data techniques are being used to implement the high speed processing required in an autocorrelation type linear predictive coder (LPC) and decoder. The remaining processing will then be performed in relatively low speed (and therefore low cost) microprocessors. Also important in a complete narrow band vocoder is a pitch tracker. The method being investigated for this function is a modified version of the Gold-Rabiner time domain algorithm implemented using a hybrid analog-digital approach. This report will be a brief summary of the present state of the work on the above three components of a complete LPC vocoder. GRA

N79-12311# Western Washington State Coll., Bellingham.

A NEUTRINO COMMUNICATIONS SYSTEM

James Albers and Peter Kotzer (ONR) 25 Apr. 1978 12 p refs

(Contract N00014-77-C-0363)

(AD-A058003) Avail: NTIS HC A02/MF A01 CSCL 20/8

Described in this note are modifications to the Fermilab Accelerator loading and unloading system, a time synchronization system (to provide the necessary common time base) and a receiver which serve as a theoretical model for a workable neutrino communications system. The communications system is based on the fact that protons circulate in thirteen booster batches each consisting of 84 precisely spaced rf buckets each bucket one nanosecond wide and 18.83 nanoseconds in spacing. An encoder is proposed to write the information in digital form. GRA

N79-12312# Mitre Corp., Bedford, Mass.

SEEK IGLOO LIFE CYCLE COST MODEL, COST ELEMENT EQUATIONS, VOLUME 1 Final Report

R. A. Moynihan and W. M. Stein Jul. 1978 60 p

(Contract F19628-78-C-0001)

(AD-A057444; MTR-3577-Vol-1; ESD-TR-78-155-Vol-1) Avail: NTIS HC A03/MF A01 CSCL 05/4

An interactive Life Cycle Cost (LCC) Mathematical model with a built-in Sensitivity Analysis capability has been developed for use in the evaluation of proposed designs for the Air Force SEEK IGLOO Radar System. The SEEK IGLOO LCC Model consists of 10 cost elements which describe acquisition costs as well as operation and support costs. This volume presents the equations for these cost elements. Also included is a full discussion of the assumptions made which impact the development of these cost element equations. Author (GRA)

N79-12313# Telefonaktiebolaget L. M. Ericsson, Moelndal (Sweden). MI Div.

AN AEROMARITIME SATELLITE SYSTEM PAYLOAD DEFINITION

Paris ESA Mar. 1978 120 p refs

(Contract ESTEC-3200/77)

(MI/Km-8134; ESA-CR(P)-1096) Avail: NTIS HC A06/MF A01

The application of a multibeam array system in a combined operational aeronautical and maritime mission for the years 1985 to 1992 is described. Topics include mission objective, frequency

plan, coverage, transponder configuration, link budgets, and eclipse performance. The payload requirements were: mass 200 kg, payload power daylight maximum 2100 W, and eclipse typical 750 W. A three satellite aeronautical and maritime geostationary system was assumed. The most severe restrictions were: (1) lack of spectrum on return link to accomodate all required channels without resorting to use of extensive on board switching or frequency reuse; (2) undefined aircraft EIRP. Both of these problems were treated in a parametric way. Author (ESA)

N79-12314# National Technical Information Service, Springfield, Va.
ANTENNA SIDE LOBE AND INTERFERENCE REDUCTION. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Aug. 1978
William E. Reed Sep. 1978 154 p Supersedes NTIS/PS-77/0889; NTIS/PS-76/0776
(NTIS/PS-78/0983/3; NTIS/PS-77/0889; NTIS/PS-76/0776) Avail: NTIS HC $28.00/MF $28.00 CSCL 09E

The bibliography cites research covering techniques for sidelobe cancellation and interference rejection. Techniques include signal processing, beam forming, null steering adaptive systems, phase shifters, element spacing, filters, and electromagnetic absorbing materials. This updated bibliography contains 148 abstracts, 17 of which are new entries to the previous edition. GRA

N79-12315# National Technical Information Service, Springfield, Va.
SPEECH INTELLIGIBILITY. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Aug. 1978
Carolyn A. Shonyo Sep. 1978 248 p Supersedes NTIS/PS-77/0835; NTIS/PS-76/0713; NTIS/PS-75/669; NTIS/PS-75/053 (NTIS/PS-78/0980/9; NTIS/PS-77/0835; NTIS/PS-76/0713; NTIS/PS-75/669; NTIS/PS-75/053) Avail: NTIS HC $28.00/MF $28.00 CSCL 17B

The bibliography contains selected references to Federally-funded research reports. The citations contain results of studies on the intelligibility of direct oral communication between humans. The bibliography also cites research on speech transmitted via voice communication systems and equipment. Studies on factors which enhance or interfere with auditory perception of underwater speech and helium speech are included. Most of the citations deal with the English language. GRA

N79-12316# Computer Sciences Corp., Falls Church, Va.
MARITIME SATELLITE COMMUNICATIONS: A MANAGEMENT PERSPECTIVE Final Report, Feb. 1976 - Apr. 1978
William H. Penrose Apr. 1978 70 p refs
(PB-283698/9; MA-RD-930-78060) Avail: NTIS HC A04/MF A01 CSCL 17B

The results are summarized of a study of the long-run costs and benefits of maritime satellite communications. The study reviews the efforts of participating U.S. flag shipping companies in using this new technology to solve some pressing problems of fleet management. Certain technical operating and economic aspects of maritime satellite and HF (sitor/selcall) radio communications are also discussed to assist ship operators in obtaining the information needed to develop a management perspective for corporate decision making in reference to these new communications services. GRA

N79-12317# Telecom, Inc., Vienna, Va.
GOES DATA COLLECTION SYSTEM. GOES-2 TEST REPORT (GEOSTATIONARY ORBITING ENVIRONMENTAL SATELLITE)
May 1978 195 p
(PB-284162/5; TER-460-001; NOAA-78062201) Avail: NTIS HC A09/MF A01 CSCL 17B

A series of engineering tests was performed on the Data Collection System (DCS) communications links through the Geostationary Orbiting Environmental Satellite (GOES 2) which was launched by NASA. The tests were conducted at the NOAA Command and Data Acquisition (CDA) facility in Wallops, Virginia between 16 August and 20 August 1977. Both the Interrogate and Response links of the DCS were evaluated to determine their post-launch operational characteristics. The purpose of these tests was to determine the communications parameters of the DCS Interrogate and response links of the GOES 2 satellite. The data collected would be such that it could be used to: (1) verify or update the DCS System Standards and performance specifications; (2) isolate areas that could potentially impose operations limitations upon DCS users; and (3) recommend possible engineering improvements for future DCS-related equipments. GRA

N79-12318# Institute for Telecommunication Sciences, Boulder, Colo.
MEASURING CHARACTERISTICS OF MICROWAVE MOBILE CHANNELS
R. W. Hubbard, R. F. Linfield, and W. J. Hartman Jun. 1978 57 p refs
(PB-283944/7; NTIA/Rept-78/5) Avail: NTIS HC A04/MF A01 CSCL 17B

A description is given of the application of a high resolution (6 ns) pseudo-random noise (PN) channel probe for evaluating the transmission character of a land-mobile communication channel. Preliminary measurements were performed at a microwave frequency in a number of locations in Boulder, Colorado. Examples of data are presented which characterize the frequency correlation of the channel transfer function, and provide additional information on the spectral distortions caused by multipath. The data processing and analysis techniques are emphasized in the report, as they are ideally suited to developing a useful statistical summary of channel parameters. The methods are rapid, and are made from data recorded in standard analog magnetic tape in the field locations. It is recommended that a wideband channel characterization program be undertaken in the near future before spectrum congestion precludes obtaining useful data. GRA

N79-12319# Institute for Telecommunication Sciences, Boulder, Colo.
SPREAD SPECTRUM: AN ANNOTATED BIBLIOGRAPHY
E. J. Haakinson May 1978 75 p
(PB-283964/5; NTIA/SP-78/1) Avail: NTIS HC A04/MF A01 CSCL 17B

Particular interest is given to the application of spread spectrum (SS) to the land mobile radio service. In order that knowledge gained about SS in other radio services can be transferred to land mobile radio, a search was made of current articles in the open literature to produce an annotated bibliography. The bibliography is arranged into several major groupings: (1) tutorial; (2) applications; (3) interference rejection; (4) spread spectrum systems studies; (5) multipath propagation; (6) direct sequence/frequency hopping/chirp techniques; (7) modulation/demodulation; (8) synchronization/tracking; and (9) codes for spread spectrum. GRA

N79-12107*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. TDA Engineering Office.
DSN RADIO SCIENCE SYSTEM, MARK III-78
A. L. Berman *In its* The Deep Space Network 15 Oct. 1978 p 4-13 refs (For primary document see N79-12105 03-12) Avail: NTIS HC A06/MF A01 CSCL 17B

N79-12115*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. TDA Engineering Office.
RADIO SCIENCE REQUIREMENTS AND THE END-TO-END RANGING SYSTEM
A. L. Berman *In its* The Deep Space Network 15 Oct. 1978 p 65-71 refs (For primary document see N79-12105 03-12) Avail: NTIS HC A06/MF A01 CSCL 17B

N79-12116*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. TDA Engineering Office.
PARAMETRIC MODELING OF LOW-FREQUENCY WATER-VAPOR-INDUCED TROPOSPHERIC PATH LENGTH FLUCTUATIONS
A. L. Berman *In its* The Deep Space Network 15 Oct. 1978 p 72-76 refs (For primary document see N79-12105 03-12) Avail: NTIS HC A06/MF A01 CSCL 20N

N79-12118*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystems Section.
DUAL-FREQUENCY FEED CONE ASSEMBLIES FOR 34-METER ANTENNAS

R. W. Hartop *In its* The Deep Space Network 15 Oct. 1978 p 85-88 refs (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 09C

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N79-12320 Johns Hopkins Univ., Baltimore, Md.
ROBUST ESTIMATION OF CROSSCORRELATION FOR PARAMETER IDENTIFICATION OF LINEAR SYSTEMS Ph.D. Thesis
Santanu Basu 1978 180 p
Avail: Univ. Microfilms Order No. 7817930

An on-line identification method for linear, single-input, single output, stationary systems with noisy output measurements is developed. A realistic model is proposed for the output measurement noise which allows for distributional variations. The robust identification problem is formulated as the task of constructing an estimation scheme which is consistent. A modified method of correlation is proposed which estimates the cross correlation of the system to be identified by a recursive, nonlinear algorithm which, by limiting the amount of correction that can be applied at each stage of the recursion, gives less weight to large measurement errors than to small ones. The method's robustness is demonstrated through an extensive computer simulation in which three linear processes for eighteen different distributions of the output noise are identified. Dissert. Abstr.

N79-12321* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
COMPLEMENTARY DMOS-VMOS INTEGRATED CIRCUIT STRUCTURE Patent
Murzban O. Jhabvala, inventor (to NASA) Issued 10 Oct. 1978 11 p Filed 20 Jul. 1977 Supersedes N77-29403 (15 - 20, p 2665)
(NASA-Case-GSC-12190-1; US-Patent-4,119,996; US-Patent-Appl-SN-817413; US-Patent-Class-357-23; US-Patent-Class-357-22; US-Patent-Class-357-41; US-Patent-Class-357-45; US-Patent-Class-357-55) Avail: US Patent and Trademark Office CSCL 09A

A high speed CMOS formed on a single semiconductor substrate includes a DMOS having an asymmetric channel and a VMOS with a relatively short channel length. The short channel length of the VMOS is achieved by forming a double diffusion along one edge of a V groove, or ion implanting boron into the apex of the V groove and diffusing a single layer to a relatively deep depth along both edges of the groove.
Official Gazette of the U.S. Patent and Trademark Office

N79-12322 Utah State Univ., Logan.
AN EXPERIMENTAL INVESTIGATION OF ELECTRIC POTENTIALS ASSOCIATED WITH STEADY CONDUCTION CURRENTS IN CLOSED SUPERCONDUCTING COILS Ph.D. Thesis
Douglas Karl Lemon 1978 149 p
Avail: Univ. Microfilms Order No. 7821142

An experimental investigation of the potentials that were associated with currents in type 2 superconductors is reported. The resolution of the fundamental questions involved required a detailed study of the source of the potentials. The basic experiments were repeated, and the potentials were observed. The magnitude variation of the potentials, i.e., the proportionality between the mean and the scatter of the data were established with greater confidence than previously obtained. This provides a more complete data base for future investigation.
Dissert. Abstr.

N79-12323 Colorado State Univ., Fort Collins.
ELECTRICAL TRANSPORT IN InAs EPITAXIAL LAYERS Ph.D. Thesis
Hudson A. Washburn 1978 142 p
Avail: Univ. Microfilms Order No. 7820883

The electrical transport characteristics of InAs epitaxial layers on semi-insulating GaAs substrates in an MOS configuration were measured and analyzed. A three-layer model was used in conjunction with gate voltage control of the front surface and magnetic field dependence of the conductivity and Hall coefficient to determine carrier densities and mobilities in the front surface, the bulk and the InAs-GaAs interface region at 77K. Thickness and temperature dependence measurements have confirmed this three layer model. At lower temperatures oscillatory magnetotransport were observed and identified as surface quantization effects. The temperature magnetic field and gate voltage dependences of these oscillations were used to determine scattering lifetimes and effective masses. The latter increased with surface carrier density as a result of the non-parabolic nature of the InAs conduction band. Dissert. Abstr.

N79-12324 California Univ., Los Angeles.
A NEW INTERFACE AMPLIFIER CONCEPT FOR FAST DIGITAL-TO-ANALOG CONVERTERS Ph.D. Thesis
Bakhtiar Farhad Haghighi 1978 132 p
Avail: Univ. Microfilms Order No. 7820227

A new interface amplifier is proposed which can tolerate an appreciable capacitive loading without affecting time. It utilizes a low loop-gain approach with large internal bandwidth and excellent open-loop gain linearity. As a result, the amplifier overdrive can also be eliminated, provided that the rise and fall times of the converter's output current stay within prescribed limits. Contrary to the present high-speed D/A converter realizations, in this application only a low-current, low-power D/A converter is required. With an input capacitance of 350 pF and a load capacitance of 12 pF, the measured settling time of the new interface amplifier is less than 100 ns to within + or - 0.05% for output-signal swings of + or - 10 V. Dissert. Abstr.

N79-12325 Illinois Univ. at Urbana-Champaign, Urbana.
THEORY AND EXPERIMENTS ON LARGE SIGNAL SURFACE TRANSPORT IN METAL OXIDE SEMICONDUCTOR CAPACITORS Ph.D. Thesis
Allen Pang-I Ho 1978 94 p
Avail: Univ. Microfilms Order No. 7820961

A distributed equivalent circuit model approach is taken in which the fundamental Shockley equations governing charge transport are transformed into time- and signal-dependent equivalent circuits. These equivalent circuits are shown to be valid for arbitrary signal levels and arbitrary time dependence. In addition, experimental MOSC devices with radial symmetry were fabricated and tested under large-signal excitations. The resulting experimental data are used to verify the validity of the equivalent circuit models. Dissert. Abstr.

N79-12326 California Univ., Los Angeles.
ANALYSIS OF MICROSTRIP LINES ON INHOMOGENEOUS ANISOTROPIC SUBSTRATES BY THE TLM NUMERICAL TECHNIQUE Ph.D. Thesis
Geoffrey Elisante Mariki 1978 158 p
Avail: Univ. Microfilms Order No. 7820259

The frequency-dependent propagation characteristics of microstrip lines on inhomogeneous anisotropic substrates are studied for the special case where the permittivity tensor may be diagonalized with respect to the chosen coordinate system. The corresponding problem of microstrip on inhomogeneous anisotropic magnetic substrates may be treated in exactly the same manner. The TLM Numerical Technique is described as well as its ability to determine the relative magnitudes of all or any of six electromagnetic field components. Dispersion diagrams for the phase constant, effective permittivity, and characteristic impedance are obtained for several microstrip geometries. Sapphire substrates and substrates with periodically stratified index of refraction were used. Dissert. Abstr.

N79-12327 Colorado Univ. at Boulder.
INVESTIGATION OF THE CHARACTERISTICS OF InP SCHOTTKY-GATE FIELD EFFECT TRANSISTORS BY COMPUTER SIMULATION Ph.D. Thesis
David Elliott Norton 1978 183 p

Avail: Univ. Microfilms Order No. 7820542

The operation of InP field effect transistors was investigated with particular attention paid to velocity overshoot effects, the role of the substrate, and the existence of negative resistance regions in the current voltage characteristics. The approach was to numerically solve two sets of electron transport equations that were derived from Boltzmann's transport equation. The first set of equations accounts for nonlocal effects in electron transport. The second set of equations, the conventional set of semiconductor equations, assumes a one-to-one correspondence between the local electric field and electron velocity. Electron velocity overshoot, a consequence of nonlocal effects was examined through a comparison of results for device simulation performed with the two sets of equations. Dissert. Abstr.

N79-12328 Purdue Univ., Lafayette, Ind.
TECHNIQUES FOR DETERMINING THE STABILITY OF TWO-DIMENSIONAL RECURSIVE FILTERS AND THEIR APPLICATION TO IMAGE RESTORATION Ph.D. Thesis
Brian Thomas OConnor 1978 249 p
Avail: Univ. Microfilms Order No. 7821481

General stability theorems and simple stability tests for two dimensional recursive digital filters were developed. The most general class of two dimensional filters was defined and several stability theorems for the class of filters are presented. The stability of any type of recursive filter can be determined from the stability of a first quadrant filter obtained by a suitable mapping of the original filter. A second theorem relates the stability of any type of two dimensional recursive filter to several simple conditions. Dissert. Abstr.

N79-12329 Colorado State Univ., Fort Collins.
DYNAMICS OF NONLINEAR MAGNETOHYDRODYNAMIC FLOWS IN DIFFUSERS Ph.D. Thesis
Soo Hyan Choi 1978 151 p
Avail: Univ. Microfilms Order No. 7820845

Four correlated theoretical investigations regarding viscous, incompressible, two dimensional magnetohydrodynamic (MHD) steady-state flow in plane diffusers having arbitrary duct angles in the presence of external magnetic fields are presented. The investigations include the following: (1) MHD flow across azimuthal magnetic field in a diffuser under consideration of viscous stress relaxation, for which a self-similar solution is given; (2) MHD diffuser duct flow across an azimuthal magnetic field under consideration of induced magnetic fields; (3) MHD flow across an external axial magnetic field in a diffuser under consideration of induced magnetic field which is also in the axial direction; and (4) combined fluid dynamics and heat transfer in a MHD diffuser duct flow with a constant wall temperature in the presence of an azimuthal magnetic field. Dissert. Abstr.

N79-12330 Purdue Univ., Lafayette, Ind.
TRANSIENT ELECTRICAL TORQUES IN SOLID IRON ROTOR TURBOGENERATORS Ph.D. Thesis
David Robert Brown 1978 106 p
Avail: Univ. Microfilms Order No. 7821424

The analytical basis for the calculation of electromagnetic torque is reviewed and a method is presented for determining the order of and parameters for a machine model which can be used for the accurate calculation of transient electromagnetic torque. The method is demonstrated and evaluated by comparison of simulation results. To accomplish this, a validated benchmark model is chosen and a reduced model is derived therefrom. The accuracy of the reduced model is established for a three phase fault, out-of-phase synchronization, a fast reclosing sequence and selected unbalanced fault situations. The effects of saturation representation and excitation system response on the accuracy of the reduced model are also investigated. Dissert. Abstr.

N79-12331* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
LIGHTWEIGHT ELECTRICALLY-POWERED FLEXIBLE THERMAL LAMINATE Patent
Frederic S. Dawn and Dale G. Sauers, inventors (to NASA) Issued 15 Aug. 1978 3 p Filed 14 Jan. 1975 Supersedes N75-16635 (13 - 08, p 0865)
(NASA-Case-MSC-12662-1; US-Patent-4,107,363; US-Patent-Appl-SN-540779; US-Patent-Class-428-109; US-Patent-Class-428-247; US-Patent-Class-428-258; US-Patent-Class-428-259) Avail: US Patent and Trademark Office CSCL 09A

Cross-layered woven or unwoven yarns are used to provide an active thermal control mechanism for spacecraft use. One set of yarns is composed of flexible electrically conductive metal fibers which are capable of being resistance heated by the application of voltage. Another set of yarns, nonconductive and flexible, provides mechanical strength and precludes the passage of electrical current between the metal yarns by virtue of the spacing between them. A lightweight, electrically nonconductive film is bonded to the cross-layered yarns to protect the metal yarns from the elements (minimize electrical shorts from moisture such as rain), to provide additional strength to the fabric, and to prevent conductive loss of heat in nonvacuum applications. The nonconductive film is metalized on its obverse side to provide a more uniform heat load distribution.
Official Gazette of the U.S. Patent and Trademark Office

N79-12332# Georgia Inst. of Tech., Atlanta.
FEDERAL AVIATION ADMINISTRATION - GEORGIA INSTITUTE OF TECHNOLOGY WORKSHOP ON GROUNDING AND LIGHTNING PROTECTION Final Report
May 1978 415 p refs Workshop held at Atlanta, 2-4 May 1978
(AD-A058797; FAA-RD-78-83) Avail: NTIS HC A18/MF A01 CSCL 04/1

A state-of-art review and background research reveals a number of opinions as to the preferred techniques of grounding of electronic equipment and systems. These techniques become important when protection must be provided for transients induced by lightning, electromagnetic pulses and other sources. G.G.

N79-12333# TRW Semiconductors, Inc., Lawndale, Calif.
MONOLITHIC 20W 2GHz TRANSISTOR AND MONOLITHIC 5W 4GHz TRANSISTOR Quarterly Report, 14 Mar. - 13 Jun. 1978
A. Harrington, W. Imhauser, B. Lindgren, and G. Schreyer Jul. 1978 45 p
(Contract DAAB07-77-C-0431)
(AD-A059232; QR-4) Avail: NTIS HC A03/MF A01 CSCL 09/5

One wafter of L-10 devices was completed during this period. Performance at 2GHz was poor, however, performance at 1GHz was acceptable. The poor performance was due to poor quality epitaxial material. Author (GRA)

N79-12334# Electronics Research Lab., Adelaide (Australia).
A 24V dc LOW VOLTAGE COMPENSATOR
B. W. Rice May 1978 16 p
(AD-A059236; ERL-0008-TR) Avail: NTIS HC A02/MF A01 CSCL 09/5

This report describes the operation and performance of a '24V dc Low Voltage Compensator'. This is a device which was built to overcome the problem of low input voltages to electronic equipment when operating them from poorly regulated supplies. It is very useful in trial situations when operating with long lead lengths. It operates by taking some of the input energy and converting it by way of ultrasonic frequencies to a dc voltage which is then added in series with the input in order to obtain a constant output voltage. Author (GRA)

N79-12335# TRW Defense and Space Systems Group, Redondo Beach, Calif.
LSI IMPLEMENTATION Final Report, Apr. 1974 - Oct. 1977
J. L. Buie Wright-Patterson AFB, Ohio AFML Dec. 1977 345 p
(Contract F33615-74-C-1103)
(AD-A057874; AFAL-TR-77-261) Avail: NTIS HC A15/MF A01 CSCL 09/5

This program emphasizes practical hardware objectives in LSI form for implementing digital filters as a general class of applications and the Fast Fourier Transform (FFT) algorithm as a specific application. Three LSI chip designs were completed, the SPAU for signal processing arithmetic unit, the SPDL for signal processing delay line, and the SPAC for signal processing address control. The most comprehensive design, the SPAU, went

through two design iterations and the final version has achieved a high degree of acceptance for general filter processing applications. Twenty-five chips each of the SPAU and SPAC designs were delivered. Fifty units of the SPDL were delivered as well as hardware samples of work in progress from time-to-time. Insofar as practical, universal designs were sought and believed achieved, particularly in the SPAU. Based on comparative studies of these implementations and SSI/MSI/LSI alternatives, a large saving in board space, power, and interconnections results from using these generic type LSI chips developed by this program. GRA

N79-12336# Naval Avionics Facility, Indianapolis, Ind.
PRINTED-WIRING ASSEMBLIES DETECTION OF IONIC CONTAMINANTS
W. T. Hobson 24 Jul. 1978 18 p refs Revised
(AD-A057364; NAFI-MRR-3-72) Avail: NTIS HC A02/MF A01 CSCL 09/5

A test for determining the ionic contaminants on printed-wiring assemblies was proposed, defined, and found feasible. The basis of the test is the change in electrical resistivity of the solvent with which the chemist washed the printed-wiring assembly. The solvent was 75% by volume, ACS Reagent Grade isopropyl alcohol. The resistivity is lowered when contaminants, such as flux residues, are dissolved. Establishing acceptance criteria for clean printed-wiring assemblies was beyond the scope of this investigation. Author (GRA)

N79-12337# Air Force Weapons Lab., Kirtland AFB, N. Mex.
COMPARISON STUDY OF THE FIVE TRANSISTOR-TRANSISTOR-LOGIC (TTL) FAMILIES AND EMITTER COUPLED LOGIC (ECL) Final Report
Michael G. Knoll May 1978 99 p refs
(AD-A058093; AFWL-TR-78-5) Avail: NTIS HC A05/MF A01 CSCL 09/5

This report describes the radiation test response of the five transistor-transistor-logic (TTL) technologies and the emitter-coupled-logic (ECL) technology. The five TTL technologies evaluated were Standard, High Speed, Low Power, Low Power Schottky, and Schottky. Quad dual input NAND (TTL) or NOR (ECL) gates and dual D flip-flops from each technology were tested. The devices were characterized for gamma dose-rate logic upset, total gamma dose survivability, and neutron fluence survivability. The data has been analyzed to provide a comparison of each logic technology's radiation response. Author (GRA)

N79-12338# Stanford Univ., Calif. Digital Systems Lab.
SPRINT: AN INTERACTIVE SYSTEM FOR PRINTED CIRCUIT BOARD DESIGN: FUNCTIONAL CHARACTERISTICS
W. M. VanCleemput, T. C. Bennett, J. A. Hupp, and K. R. Stevens Nov. 1977 35 p refs
(Contracts N00014-75-C-0601; E4-76-C-03-0515)
(AD-A057465; SU-DSL-TN-131) Avail: NTIS HC A03/MF A01 CSCL 09/2

The SPRINT system, designed and implemented on the IBM 370 system at the Stanford Linear Accelerator Center (SLAC), is a highly interactive system for the layout of printed circuit boards. At the choice of the designer, a layout can be generated manually, automatically or usually by a combination of man-machine interaction and automatic design algorithms. Author (GRA)

N79-12339# Northwestern Univ., Evanston, Ill.
BRUSHES WITH HIGH CURRENT AND HIGH SLIDING SPEED M.S. Thesis, Jun. 1977 - May 1978
Chi-Ping Chen and Ralph A. Burton May 1978 26 p refs
(Contract N00014-75-C-0761)
(AD-A058319; Rept-5341-427) Avail: NTIS HC A03/MF A01 CSCL 09/1

Experimental results in the literature indicate that electric brushes may deform, leading to point contact with the slip ring at high current levels. The present work provides theoretical support for these observations and a quantitative statement showing how operating variables influence this behavior. The analysis is restricted to a two dimensional model of the brush, with isotropic and constant material properties. The most unexpected result is that, for steady current flow, cooling of the exterior of the brush increases the tendency to deform unfavorably. Author (GRA)

N79-12340# Litton Systems, Inc., San Carlos, Calif. Electron Tube Div.
STRAPPED MULTIFILAR HELIX TWT STUDY Final Report, Apr. 1976 - Mar. 1978
Yukio Hiramatsu 1 Jun. 1978 49 p refs Prepared in cooperation with Microwave Associates, Burlington, Mass. and Software House, Inc., Washington D.C.
(Contracts N00173-76-C-0194; N00173-76-C-0001)
(AD-A058007) Avail: NTIS HC A03/MF A01 CSCL 09/1

The goal of this program was to determine the feasibility of using strapped multifilar helices in traveling wave tubes at higher operating voltages and power levels than was possible with existing helix-type tubes. Several cold test circuits were fabricated and tested by comparison with conventional helix and ring-loop circuits. None of the circuits was found to be satisfactory for inclusion in an operating tube, therefore this phase of the effort was terminated. Author (GRA)

N79-12341# Avantek, Inc., Santa Clara, Calif.
MICROWAVE GALLIUM ARSENIDE FET AMPLIFIERS Final Report, Jun. 1975 - Nov. 1977
H. F. Cooke and S. Hennies Jun. 1978 210 p refs
(Contract N00014-75-C-1163; XF54581004; XF54545602)
(AD-A058270) Avail: NTIS HC A10/MF A01 CSCL 09/5

FETs suitable for amplification through 18 GHz were developed with noise figures of 2.3 dB at 18 GHz. Using these FETs amplifiers covering 7 - 18 GHz and 10 - 18 GHz were successfully developed. All major specifications were met over the entire band. Author (GRA)

N79-12342# Naval Air Engineering Center, Lakehurst, N.J. Dept. of Ground Support Equipment.
ELECTRIC GENERATOR DEVELOPMENT FOR THE 1980'S Final Report, Jul. 1975 - Apr. 1978
William Uellner 15 May 1978 135 p refs Supersedes NAEC-GSED-107
(WF41461)
(AD-A057448; NAEC-92-125; NAEC-GSED-107) Avail: NTIS HC A07/MF A01 CSCL 10/2

This report outlines the development of a 400 HZ, 30 KW generator, to be used in a Mobile Electric Power Plant (MEPP). The developed generator complies with the new standard for ground power, MIL-STD-704C. A computer aided design was used to develop engineering generator system parameters from desired specified output requirements. The computer program was fully substantiated by actual test results. Author (GRA)

N79-12343# Mississippi State Univ., Mississippi State. Dept. of Electrical Engineering.
A NUMERICAL MODEL FOR THERMAL SECOND BREAKDOWN Final Report, 1 Jul. - 31 Dec. 1977
Wayne H. Causey, Jr. May 1978 148 p refs
(Grant DAAG29-77-G-0190)
(AD-A057598; MSSU-EIRS-EE-78-3; ARO-15304.1-A-EL)
Avail: NTIS HC A07/MF A01 CSCL 09/3

A computer model is developed for simulating reverse bias thermal second breakdown (TSB) transients in thin film diodes. The model performs a one-dimensional electrical and a two-dimensional thermal simulation. Simulations are performed up to the onset of the TSB transition to a high conductance state. This condition is defined as a maximum junction temperature of 700 K. The model is driven by a constant current source and features temperature and electric field dependent avalanche ionization coefficients, temperature, electric field and doping level dependent mobilities, and depletion region space charge effects. Simulations are defined through 271 parameters which specify diode design, thermal conductivity perturbations, and control of the simulation. The program generates graphic output and requires short run times. GRA

N79-12344# Army Electronics Research and Development Command, Fort Monmouth, N. J. Electronics Technology/Devices Lab.
DESIGN OF BIASING MAGNETS FOR E-F AND I-J BAND CROSS-FIELD AMPLIFIER TUBES Research and Development Technical Report

H. A. Leupold and F. Rothwarf Jun. 1978 23 p refs
(DA Proj. 1L1-61102-AH-47E7)
(AD-A057436; DELET-TR-78-12) Avail: NTIS HC A02/MF A01 CSCL 09/5

Design calculations are made for two alternative magnetic circuits to determine their relative suitability as field sources for an E-F band cross-field amplifier. One of the designs is found to marginally meet field requirements while the other falls short by about 10%. Similar calculations for a third configuration to be used in an I-J band amplifier also show marginal performance even if the best commercially available samarium cobalt-5 magnets are to be employed. An enhancement of magnetic remanence of 25% above those of presently available materials is necessary to make these designs practicable. GRA

N79-12345# Harry Diamond Labs., Adelphi, Md.
STATISTICAL ANALYSIS OF THE 2N697 TRANSISTOR RESPONSE TO NEUTRON IRRADIATION
Charles T. Self Jun. 1978 25 p refs
(DA Proj. 1L1-162118-AH-75)
(AD-A059293; HDL-TM-78-7) Avail: NTIS HC A02/MF A01 CSCL 09/1

A statistical analysis was performed on transistors' dc gain h sub FE to determine the effects of neutron irradiation upon their population distribution. The 2N697 transistor was used for this analysis. One hundred transistors from three lots and two manufacturers constituted the test population. It was found that h sub FE measurements do not give enough information to make accurate predictions of the effect of neutron irradiation on population densities. It is recommended that the gain-bandwidth product also be a test parameter to insure accurate predictions. Author (GRA)

N79-12346# California Univ., Berkeley. Electronics Research Lab.
NONLINEAR CIRCUIT THEORY Interim Report
L. O. Chua 17 Apr. 1978 110 p refs Presented at European Conf. on Circuit Theory and Design, Lausanne, Switzerland, 4-8 Sep. 1978
(Contract F44620-76-C-0100; AF Proj. 2305)
(AD-A059228; UCB/ERL-M78/28; AFOSR-78-1316TR) Avail: NTIS HC A06/MF A01 CSCL 09/5

Many highly nonlinear devices have been invented over the past two decades and are becoming increasingly important in the design of modern electronic systems. The behavior of these systems can be extremely complex and any circuit theory for analyzing such exotic phenomena must necessarily be nonlinear. In particular, some recent research on the modeling of nonlinear devices has demonstrated the dire need for developing a foundation for nonlinear circuits. GRA

N79-12347# Washington Univ., Seattle Lab. for Chemometrics.
MINICOMPUTER CONTROLLED, BACKGROUND SUBTRACTED ANODIC STRIPPING VOLTAMMETRY: EVALUATION OF PARAMETERS AND PERFORMANCE Technical Interim Report, Feb. 1978 - Aug. 1978
Steven D. Brown and Bruce R. Kowalski Aug. 1978 66 p refs
(Contract N00014-75-C-0536; NR Proj. 051-565)
(AD-A058829) Avail: NTIS HC A04/MF A01 CSCL 09/3

A new minicomputer controlled anodic stripping voltammetry technique is described. The technique uses differential voltammetry on one electrode and uses a rapid data averaging algorithm to avoid the need for scan averaging, allowing excellent sensitivities and short analysis times, with adequate reproducibilities. Both linear scan and staircase waveforms are discussed and the approximate Roe-Toni theory for linear scan voltammetry is shown to apply. The viability of the technique in solutions showing a large background is also discussed. Author (GRA)

N79-12348# Army Mobility Equipment Research and Development Command, Fort Belvoir, Va.
TEST AND EVALUATION OF THE CRAVENS WANLASS MODIFICATION FOR SELECTED SINGLE PHASE FRACTIONAL HORSEPOWER MOTORS
T. D. Cooper May 1978 179 p
(Contract EC-77-A-01-8295)
(HCP/M8295-01) Avail: NTIS HC A09/MF A01

Tests are reported of four single phase, fractional horsepower motors before and after modification in accordance with principles established to effect improvements in energy efficiency. It compares motor characteristics before and after modification, and concludes that the change does, in fact, improve energy efficiency of the motors tested, but at the cost of degrading breakdown torque, avoidable only by introducing additional components. It concludes that the Wanlass modification may be employed to effect worthwhile energy savings, but that each application must be examined on a case by case basis from the standpoints of performance and economics. DOE

N79-12349# National Technical Information Service, Springfield, Va.
ION SELECTIVE ELECTRODES. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - Sep. 1978
Diane M. Cavagnaro Sep. 1978 152 p Supersedes NTIS/PS-77/0875; NTIS/PS-76/-0741; NTIS/PS-75/622
(NTIS/PS-78/0964/3; NTIS/PS-77/0875; NTIS/PS-76/0741; NTIS/PS-75/622) Copyright. Avail: NTIS HC $28.00/MF $28.00 CSCL 07D

Federally-funded research on the use of ion selective electrodes for chemical analysis is cited. Design, analytical methods, and applications are covered. This updated bibliography contains 146 abstracts, 18 of which are new entries to the previous edition. GRA

N79-12350# National Technical Information Service, Springfield, Va.
ION SELECTIVE ELECTRODES. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Aug. 1978
Diane M. Cavagnaro Sep. 1978 127 p Supersedes NTIS/PS-77/0876; NTIS/PS-76/0742
(NTIS/PS-78/0965/0; NTIS/PS-77/0876; NTIS/PS-76/0742) Avail: NTIS HC $28.00/MF $28.00 CSCL 07D

These worldwide citations cover research on the design, performance evaluation, theory, applications, analytical methods and sensitivity of electrodes sensitive only to certain types of ions. This updated bibliography contains 121 abstracts, 12 of which are new entries to the previous edition. GRA

N79-12112*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystems Section.
A PROTOTYPE DSN X-S BAND FEED: DSS 13 APPLICATION STATUS, SECOND REPORT
W. F. Williams *In its* The Deep Space Network 15 Oct. 1978 p 39-50 refs (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 09C

N79-12119*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Communications Systems Research Section.
STABLE LOW NOISE VOLTAGE SOURCE
G. F. Lutes *In its* The Deep Space Network 15 Oct. 1978 p 89-93 (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 09C

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N79-12351 Notre Dame Univ., Ind.
STUDIES OF STATISTICAL BIAS IN TURBULENT FLOW PARAMETERS MEASURED WITH A LASER VELOCIMETER Ph.D. Thesis
Thomas Vincent Giel, Jr. 1978 125 p
Avail: Univ. Microfilms Order No. 7821645

Bragg diffracted individual realization laser velocimeter measurements were taken in a jet flow in which efforts were

made to attain the conditions that theoretically result in bias. Arithmetic mean velocities and turbulence intensities were determined from the measurements and compared with pitot and hot-wire measurements, but no clear evidence of statistical bias was found. In addition several bias correcting algorithms were employed to evaluate the laser velocimeter measurements and it was found that routinely correcting for bias can produce serious errors. To analyze effects that might reduce bias under experimental conditions a numerical experiment was devised to show the relation of seeding rate and flow structure to bias. Further analysis showed the bias reduction that can occur when the velocities of some particles crossing the probe volume are not recorded and when the seed distribution was not perfectly uniform. In addition, the bias reduction due to three dimensional flow was considered. Dissert. Abstr.

N79-12352 Rhode Island Univ., Kingston.
AN EXPERIMENTAL STUDY OF POLYMER DRAG REDUCTION AND BOUNDARY LAYER DIFFUSION CHARACTERISTICS FOR INCOMPRESSIBLE FLOW OVER A FLAT PLATE Ph.D. Thesis
John Miguel 1978 399 p
Avail: Univ. Microfilms Order No. 7820819

The effect of injecting polymer into a developing boundary layer was determined through the measurement of polymer boundary layer concentration distributions and velocity profiles. To reach this objective, methods to predict local skin friction coefficients were developed as a function of local polymer concentrations and experimentally verified. Tests were also performed using the injection of water and solutions of a drag reduction polymer. Polymer wall concentration distributions indicated the effectiveness of injecting lower concentrations of polymer. Growth of the diffusion boundary layer was shown to depend on the flux of polymer injected into the boundary as well as the injection velocity ratio, defined as the ratio of the injected polymer velocity to the average velocity of the tunnel flow. Dissert. Abstr.

N79-12353 Ohio State Univ., Columbus.
ON THERMAL CONVECTION IN A FLUID HEATED FROM WITHIN AND BOUNDED FROM BELOW BY A SPHERICAL SEGMENT Ph.D. Thesis
Joon Hong Min 1978 267 p
Avail: Univ. Microfilms Order No. 7819637

Experimental and theoretical studies were conducted on thermal convection in an internally heated fluid layer bounded from above by a rigid, isothermal horizontal surface and from below by a rigid, zero heat-flux surface comprising a spherical segment. Experimental data on the steady-state heat transfer and the transient thermal response in the fluid layer were obtained for layer geometries that range from nearly a spherical segment to a spherical segment with a superposed horizontal layer. Volumetric energy sources within the fluid were provided by Joule heating with alternating current passing between the upper and lower surfaces of the layer. The calculated isotherms and streamlines show a strong influence of geometrical factors on the overall features of the convective processes in the spherical-segment cavity. In general, regions of relatively low velocity exist near the edge and center of the spherical segment for steady convection. Dissert. Abstr.

N79-12354 Purdue Univ., Lafayette, Ind.
TURBULENT STRUCTURE MEASUREMENTS AND THERMAL TRANSPORT MODELING IN LIQUID METALS Ph.D. Thesis
L. Loren Eyler 1978 367 p
Avail: Univ. Microfilms Order No. 7821439

The turbulent transport of heat and momentum is studied for mercury flow in a vertical pipe. Measured turbulent transport of heat and momentum results are presented. In addition, interdependencies of the turbulent flow components and the turbulent transport structure are investigated using calculated statistical properties. These results indicate the marked difference in the nature of thermal transport in low Prandtl number fluids compared with that in other fluids. They also indicate that significant contributions to total transport span wide ranges in wave-number and that a large portion of the transport occurs in low wave-number (large scale) inhomogeneous regions. A calculation technique which is capable of predicting radial turbulent heat fluxes in low-Prandtl number fluids is developed. Dissert. Abstr.

N79-12355 Purdue Univ., Lafayette, Ind.
HEAT TRANSFER AND RECIRCULATING FLOW DISTRIBUTION BEHIND A NORMAL FLAT PLATE Ph.D. Thesis
Gail Ann Janko Klein 1978 212 p
Avail: Univ. Microfilms Order No. 7821463

A recirculating flow model was developed to study flow past blockages which become lodged between closely-packed fuel rods. Experiments were performed to measure the changes in the wake geometry and the normalized wake velocity with changes in the Reynolds number and blockage ratio. The model's temperature predictions, which were obtained by using the exact values of the turbulence parameters determined from analysis, compare favorably with experimental data taken behind a hexagonal blockage situated in a full scale, water cooled, SNR subassembly. Dissert. Abstr.

N79-12356 Yale Univ., New Haven, Conn.
AN EXPERIMENTAL INVESTIGATION OF THE CRITICAL SUPERSATURATION OF FIVE VAPORS IN A SHOCK TUBE Ph.D. Thesis
Chee-Fook Lee 1978 130 p
Avail: Univ. Microfilms Order No. 7820159

Pressure measurements at three different locations in the driver section of a shock tube reveal that the expansion wave generated by diaphragm rupture can be effectively viewed as a simple centered expansion wave whose origin is slightly shifted with respect to the origin of an ideal x-t diagram. The resulting centered expansion wave is used to study the condensation of water, heavy water, benzene, carbon tetrachloride and freon-11, in an excess of the non-condensing carrier argon. Simultaneous pressure and light scattering measurements determine the onset of condensation. Dissert. Abstr.

N79-12357 Utah State Univ., Logan.
TRANSIENT ANALYSIS OF TWO-VELOCITY, ONE-DIMENSIONAL, STEAM/WATER FLOW BY THE DYNAMIC SLIP TECHNIQUE Ph.D. Thesis
Delwin Clifford Mecham 1978 255 p
Avail: Univ. Microfilms Order No. 7821146

From basic principles of physics, an analytical capability in describing transient, two-velocity flow of liquid-vapor mixtures is developed. The method developed is first tested against a wide variety of small, academic problems. The method is then used to analyze the United States Nuclear Regulatory Commission's Standard Problem 6. Experimental data, which was released subsequent to the analysis of Standard Problem 6, are compared to the analytical prediction. The results show considerable improvement in analytical capability by proper treatment of separate phase velocities. Dissert. Abstr.

N79-12358 Tennessee Univ., Knoxville.
ACCURACY AND CONVERGENCE OF A FINITE-ELEMENT ALGORITHM FOR COMPUTATIONAL FLUID DYNAMICS Ph.D. Thesis
Mohamed Osama Soliman 1978 245 p
Avail: Univ. Microfilms Order No. 7823351

A Galerkin-weighted residuals formulation is employed to establish an implicit finite element solution algorithm for generally nonlinear initial-boundary value problems. Accuracy and convergence rates with discretization refinement were quantized, in several error norms, by a systematic study of numerical solutions to several non-linear parabolic and a hyperbolic partial differential equation, using linear, quadratic and cubic basis functions. Richardson extrapolation was employed to generate higher-order accurate solutions to facilitate isolation of truncation error in all norms. Direct extension of the mathematical theory underlying accuracy and convergence concepts for linear elliptic equations is proven valid for equations characteristic of laminar and turbulent fluid flows. Dissert. Abstr.

N79-12359* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FLUID VELOCITY MEASURING DEVICE Patent
David F. Thomas, Jr. and Leon A. Williams, Jr., inventors (to

NASA) Issued 31 Oct. 1978 9 p Filed 30 Nov. 1977 Supersedes N78-15438 (16 - 06, p 0758)
(NASA-Case-LAR-11729-1; US-Patent-4,122,712; US-Patent-Appl-SN-856461; US-Patent-Class-73-189; US-Patent-Class-73-194VS) Avail: US Patent and Trademark Office CSCL 20D

A fluid velocity measuring device is described which, when placed in a freestream fluid flow, causes vortices to be formed at a frequency proportional to the flow rate of the fluid. Sensors on the device generate electric signals with frequency proportional to the rate of vortex creation and with relative mean amplitudes indicative of fluid flow direction. Electric circuitry translates the electric signals into indications of fluid speed and direction.

Official Gazette of the U.S. Patent and Trademark Office

N79-12360# Royal Aircraft Establishment, Farnborough (England).

APPLICATION OF THE E. G. BROADBENT SCHEME TO TWO-DIMENSIONAL FLOW WITH WATER VAPOUR CONDENSATION IN A LAVAL NOZZLE

Magdelena Bratos and Bozena Drzazgowska Jun. 1978 15 p refs Transl. into ENGLISH from Rozpr. Inz. (Poland), v. 22, no. 4, 1974 p 645-653
(RAE-Lib-Trans-1972; BR65224) Avail: NTIS HC A02/MF A01

A numerical scheme is used to find the solution to two-dimensional flow of condensing water vapor in a Laval nozzle. The possibility is discussed of using the scheme not only for solutions for diabatic flows but also for the construction of a model for condensation (nucleation and growth of droplets) best matching theory with experiment. G.G.

N79-12361*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

DECAY OF HOMOGENEOUS TURBULENCE FROM A GIVEN STATE AT HIGHER REYNOLDS NUMBER

R. G. Deissler Nov. 1978 15 p refs Presented at the 31st Ann. Meeting of the Am. Phys. Soc. Div. of Fluid Dyn., Los Angeles, 19-21 Nov. 1978
(NASA-TM-79011; E-9796) Avail: NTIS HC A02/MF A01 CSCL 20D

The turbulence equations are closed by specification of initial conditions (using either a Taylor or an exponential series) and by a modified Kovasznay-type closure. Good results for large times are obtained only for the initial-conditions closure used with four or more terms of an exponential series. The evolution of all of the initially-specified spectra can be calculated rather well from the theory. From a fundamental standpoint the method thus seems to be satisfactory. Author

N79-12362*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

ATOMIZATION OF WATER JETS AND SHEETS IN AXIAL AND SWIRLING AIRFLOWS

Robert D. Ingebo [1977] 12 p refs Proposed for presentation at the 24th Ann. Intern. Gas Turbine Conf., San Diego, Calif., 11-15 Mar. 1979; sponsored by the Am. Soc. of Mech. Engr.
(NASA-TM-79043; E-9847) Avail: NTIS HC A02/MF A01 CSCL 20D

Axial and swirling airflows were used to break up water jets and sheets into sprays of droplets to determine the overall effects of orifice diameter, weight flow of air, and the use of an air swirler on fineness of atomization as characterized by mean drop size. A scanning radiometer was used to determine the mean drop diameter of each spray. Swirling airflows were produced with an axial combustor, 70 deg blake angle, air swirling. Water jets were injected axially upstream, axially downstream and cross stream into the airflow. In addition, pressure atomizing fuel nozzles which produced a sheet and ligament type of breakup were investigated. Increasing the weight flow rate of air or the use of an air swirling markedly reduced the spray mean drop size. G.G.

N79-12363*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

ON THE MEASUREMENT OF TURBULENT FLUCTUATIONS IN HIGH-SPEED FLOWS USING HOT WIRES AND HOT FILMS

Mukund Acharya Nov. 1978 20 p refs
(NASA-TM-78535; A-7641) Avail: NTIS HC A02/MF A01 CSCL 20D

A hot wire has a limited life in high speed wind-tunnel flows because it is typically subjected to large dynamic loads. As a consequence hot films and modified hot wires are frequently used for turbulence measurements in such flows. However, the fluctuation sensitivities of such probes are reduced because of various factors, leading to erroneous results. This paper describes the results of tests on some sensors in both subsonic and supersonic boundary-layer flows. A simple technique to determine dynamic calibration correction factors for the sensitivities is also presented. Author

N79-12364*# Polytechnic Inst. of New York. Aerodynamics Labs.

NAVIER-STOKES CALCULATIONS WITH A COUPLED STRONGLY IMPLICIT METHOD. PART 2: SPLINE SOLUTIONS

S. G. Rubin and P. K. Khosla [1978] 29 p refs
(Grant NSG-1244)
(NASA-CR-157832) Avail: NTIS HC A03/MF A01 CSCL 20D

A coupled strongly implicit method is combined with a deferred-corrector spline solver for the vorticity-stream function form of the Navier-Stokes equation. Solutions for cavity, channel and cylinder flows are obtained with the fourth-order spline 4 procedure. The strongly coupled spline corrector method converges as rapidly as the finite difference calculations and also allows for arbitrary large time increments for the Reynolds numbers considered. In some cases fourth-order smoothing or filtering is required in order to suppress high frequency oscillations. G.G.

N79-12365*# Science Applications, Inc., Huntsville, Ala.

ADVANCED DESIGNS FOR FLUID FLOW VISUALIZATION Final Report

Oct. 1978 33 p
(Contract NAS8-31173)
(NASA-CR-150863; SAI-79-762-HU) Avail: NTIS HC A03/MF A01 CSCL 20D

Research was carried out on existing and new designs for minimally intrusive measurement of flow fields in the Geophysical Fluid Flow Cell and the proposed Atmospheric General Circulation Experiment. The following topics are discussed: (1) identification and removal of foreign particles, (2) search for higher dielectric photochromic solutions, (3) selection of uv light source, (4) analysis of refractive techniques and (5) examination of fresnel lens applicability. L.S.

N79-12366*# United Technologies Research Center, East Hartford, Conn.

DEVELOPMENT OF A THREE-DIMENSIONAL TURBULENT DUCT FLOW ANALYSIS Final Report

P. R. Eiseman, R. Levy, H. McDonald, and W. R. Briley Nov. 1978 117 p refs
(Contract NAS3-19856)
(NASA-CR-3029) Avail: NTIS HC A06/MF A01 CSCL 20D

A method for computing three-dimensional turbulent subsonic flow in curved ducts is described. An approximate set of governing equations is given for viscous flows which have a primary flow direction. The derivation is coordinate invariant, and the resulting equations are expressed in terms of tensors. General tube-like coordinates were developed for a general class of geometries applicable to many internal flow problems. The coordinates are then particularized to pipes having superelliptic cross sections whose shape can vary continuously between a circle and a near rectangle. The analysis is applied to a series of relevant aerodynamic problems including transition from nearly square to round pipes and flow through a pipe with an S-shaped bend. Author

N79-12367# Technische Univ., Berlin (West Germany). Hermann-Foettinger Inst. fuer Thermo- und Fluiddynamik.

CONTRIBUTIONS ON TRANSPORT PHENOMENA IN FLUID MECHANICS AND RELATED TOPICS

W. Haase, comp. 12 Apr. 1977 304 p refs Partly in ENGLISH and partly in GERMAN; ENGLISH summaries Report will also be announced as translation (ESA-TT-498)

(DLR-FB-77-16) Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

Experimental and theoretical investigations on thermo-fluid-dynamics - mainly boundary layer theory, Navier-Stokes equations, thermodynamics - as well as on process technology and nuclear engineering are presented. For individual titles, see N79-12368 through N79-12404.

N79-12368# Technische Univ., Berlin (West Germany). Inst. fuer Kerntechnik.

THE DOUBLE P SUB N APPROXIMATION OF THE NEUTRON TRANSPORT EQUATION IN SLAB GEOMETRY TAKING INTO ACCOUNT LINEAR ANISOTROPIC SCATTERING [DIE DOPPEL-P SUB N - NAEHERUNG DER NEUTRONENTRANSPORTGLEICHUNG IN PLATTENGEOMETRIE UNTER BERUECKSICHTIGUNG LINEAR ANISOTROPER STREUUNG]

Gerhard Bartsch and Ulrich Hauptmanns *In its* Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 7-18 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)

Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

Extrapolation distances, collision probabilities, angular fluxes, flux ratios, and critical dimensions were calculated for one-dimensional reactor problems in slab geometry using the Double-P sub N-Method. The influence of linearly anisotropic scattering and in special cases that of a spatially constant neutron source on these characteristic parameters was investigated.

Author (ESA)

N79-12369# California State Univ., Long Beach. Dept. of Mechanical Engineering.

ON THE SOLUTION OF LAMINAR FLOW OVER A CIRCULAR CYLINDER STARTED IMPULSIVELY FROM REST

Tuncer Cebeci *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 19-28 refs (For primary document see N79-12367 03-34) (Grant NSF ENG-74-11895)

Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

A numerical method for calculating the unsteady laminar flow over a circular cylinder started impulsively from rest is presented. The governing boundary layer equations were solved using Keller's two-point finite-difference method (standard Box method). In regions where the streamwise velocity develops backflow, the solution method was modified (modified Box method) by two different procedures which allow the calculation of such flows. Local skin-friction coefficients and displacement thickness values were computed for values of t up to 1.25. These quantities agree well with the predictions of Belcher et al., but do not agree with those of Telionis and Tsahalis.

Author (ESA)

N79-12370# Karlsruhe Univ. (West Germany). Inst. fuer Stroemungslehre und Stroemungsmechanik.

TURBULENCE MEASUREMENTS IN A THREE-DIMENSIONAL TURBULENT BOUNDARY LAYER [TURBULENZMESSUNGEN IN EINER DREIDIMENSIONALEN TURBULENTEN GRENZSCHICHT]

R. Dechow (Klein, Schanzlin u. Becker AG) and K. O. Felsch *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 29-36 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)

Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

Measurements in a three-dimensional incompressible turbulent boundary layer growing in front of a cylinder standing on a flat wall in a wind tunnel were made. Beginning with the quasi two-dimensional boundary layer far in front of the cylinder the development of the boundary layer profiles were investigated along a streamline of the free stream up to the region behind the three-dimensional separation. At 14 different stations, profiles were measured of the mean velocity vector, the 6 components of the turbulent stress tensor, the static pressure, and the wall shear stress vector. Measurements of the mean velocity and the static pressure in the region outside the boundary layer were also made. From this data the direction of the velocity gradient and of the turbulent shear stress were evaluated. The applicability of different shear stress models was checked and discussed.

Author (ESA)

N79-12371# Kaiserslautern Univ. (West Germany). Abt. Mechanische Verfahrenstechnik.

ON THE MOTION OF SOLID PARTICLES IN CHEMICAL ENGINEERING [ZUR BEWEGUNG VON PARTIKELKOLLEKTIVEN IN DER VERFAHRENSTECHNIK]

Fritz Ebert *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 37-42 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)

Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

In connection with problems of chemical engineering, the motion of solid particles suspended in a fluid was studied. The example of hydraulic transport was treated by means of a simple model of particle response to fluid turbulence. The theory of Markov processes was used to describe the motion of dispersed solids in flow systems. As an example, air classifying of solids was discussed.

Author (ESA)

N79-12372# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. fuer Luftstrahlantriebe.

INVESTIGATIONS ON TURBULENCE ENERGY EQUATIONS FOR TURBULENT JETS AND JET FLAMES [UNTERSUCHUNGEN ZUR TURBULENZENERGIEGLEICHUNG AN TURBULENTEN STRAHLEN UND STRAHLFLAMMEN]

Heinrich Eickhoff and Frank Thiele (Tech. Univ. Berlin) *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 43-47 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)

Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

The behavior of the turbulent energy in round free jets and free jet diffusion flames was studied, using the Rotta inductive method for the calculation of the turbulent energy distribution from the distribution of the time averaged flow velocity. The energy distribution was compared with measurements of the axial components of the turbulence energy, using the double jet-laser method. A remarkable influence of the density distribution is shown experimentally and numerically.

ESA

N79-12373# Technische Univ., Berlin (West Germany). Hermann-Foettinger Inst. fuer Thermo- und Fluiddynamik.

THREE-DIMENSIONAL FLOW IN SAMPLING CHAMBER OF A GAS CENTRIFUGE IN THE PRESENCE OF A STATIONARY BODY. A DIFFERENCE PROCEDURE FOR SOLVING THE COMPRESSIBLE NAVIER-STOKES EQUATIONS [DIE DREIDIMENSIONALE STROEMUNG IN DER ENTNAHMEKAMMER EINER GASZENTRIFUGE BEI FESTSTEHENDEM STAUKOERPER. EIN DIFFERENZEN VERFAHREN ZUR LOESUNG DER KOMPRESSIBLEN NAVIER-STOKES-GLEICHUNGEN]

Eberhard Elsholz *In its* Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 49-57 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)

Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

The flow field in a very fast rotating chamber in the presence of a stationary body was calculated numerically from the complete set of Navier-Stokes equations. A special differential approximation provided stable and non-oscillating solutions even within the region of very small Ekman numbers. This type of approximation was derived and its advantages are discussed. A numerical result is presented which includes strong radial density gradients and shows very clearly the compressible effects and the mechanism of vortex shedding generated by the obstacle.

Author (ESA)

N79-12374# Dornier-System G.m.b.H., Friedrichshafen (West Germany).

SEPARATION POWER DENSITY OF GAS DYNAMICAL ISOTOPE SEPARATION PROCEDURES FOR THE ENRICHMENT OF U-235 IN THE PRESENCE OF LIGHT ADDITIVE GASES [DIE TRENNLEISTUNGSDICHTE VON GASDYNAMISCHEN ISOTOPENTRENNVERFAHREN ZUR ANREICHERUNG VON U-235 IN GEGENWART VON LEICHTEN

ZUSATZGASEN] **c25**
Wilmar Fuhse *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 59-63 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)
Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

The separation power density of gas dynamical enrichment processes was evaluated using a method different from that developed by Cohen. The new method allows a transparent inclusion of auxiliary gases in the theory of isotope separation. The final formula of the separation power density shows strong similarities to the equations used for binary gas mixtures. The results obtained on two component mixtures can be applied to gas dynamical enrichment processes with more than two components. Author (ESA)

N79-12375# Gesamthochschule Essen (West Germany). Fachbereich Maschinentechnik.
DRAG OF CIRCULAR CYLINDER UNDER TRANSVERSE RAREFIED GAS FLOW [DER WIDERSTAND EINES KREISZYLINDERS BEI QUERANSTROEMUNG DURCH EIN SCHWACH VERDUENNTES GAS]
Bernhard Gampert *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 65-70 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)
Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

A formula is presented giving the drag coefficient for low Re-number slip flow normal to the axis of an infinite circular cylinder. The equation is not confined to tangential accommodation coefficients of the order of unity. In contrast to the nonslip case a viscous normal stress acts across the cylinder surface. Under perfect slip the two normal stresses in common are even larger than under nonslip. For zeta = 1.0 the friction drag is already reduced to 15 % of its nonslip value. Author (ESA)

N79-12376# Fischer (Karl), Berlin (West Germany).
ENERGY CONSUMPTION FOR AERODYNAMIC SPINNING [ENERGIEVERBRAUCH BEIM AERODYNAMISCHEN SPINNEN]
L. Gerking *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 71-76 ref In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)
Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

The energy consumption of the spinning of filaments by aerodynamical drawing, used in the manufacture of nonwovens direct from the melt, is discussed. It is argued that values of 0.5 kWh/kg are normally attainable. ESA

N79-12377# Gesamthochschule, Siegen (West Germany). Fachbereich Stroemungstechnik.
THEORETICAL PREDICTION OF THE INCLINATION ANGLE OF THE SEPARATION STREAMLINE IN SEPARATION BUBBLES [THEORETISCHE VORAUSSAGE DES NEIGUNGSWINKELS DER ABLOESESTROMLINIE IN ABLOESEBLASEN]
Dieter Geropp *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 77-84 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)
Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

The angle of the separation streamline was calculated by a boundary layer integral method of the Pohlhausen type. A simple formula for the dependence on the local Reynolds number and on a pressure parameter in the separation point of a bubble is presented. The theory is confirmed by experiments. Some contradictions in published statements concerning the pressure dependence are cleared up. Author (ESA)

N79-12378# Ruhr Univ., Bochum (West Germany). Inst. fuer Thermo- und Fluiddynamik.
BOUNDARY LAYER EFFECTS OF HIGHER ORDER FOR COMBINED FREE AND FORCED CONVECTION [GRENZSCHICHTEFFEKTE HOEHERER ORDNUNG BEI KOMBINIERTER FREIER UND ERZWUNGENER KONVEKTION]
Klaus Gersten and Joao S. d'Avila (Univ. Federal de Sergipe, Aracaju, Brazil) *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 85-90 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)
Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

For flows essentially influenced by buoyancy forces the first and second-order boundary layer equations were derived. The importance of second-order boundary layer effects on combined free and forced convection is shown and discussed in detail for the flow along a horizontal heated flat plate. Author (ESA)

N79-12379# Karlsruhe Univ. (West Germany). Inst. fuer Stroemungslehre und Stroemungsmaschinen.
THE WALZ WIND VANE MODEL AND ITS APPLICATION TO THE SIMULATION OF FLOWS WITH DEAD-AIR REGIONS [DAS WALZSCHE WINDFAHNENMODELL UND SEINE ANWENDUNG ZUR SIMULATION VON STROEMUNGEN MIT TOTWASSER]
Joachim Grashof *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 91-98 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)
Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

The Walz model, developed in 1939 to simulate the deadair region past airfoils with trailing-edge flaps, is summarized and its physical background and mathematical treatment are generalized. The fundamentals of the improved method for the calculation of pressure distributions on airfoils with deadair regions are outlined. Author (ESA)

N79-12380# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. fuer Angewandte Gasdynamik.
A PROCEDURE FOR THE CALCULATION OF GAP-CORNER FLOWS [EIN VERFAHREN ZUR BERECHNUNG VON SPALT-ECKEN-STROEMUNGEN]
Roger Grundmann *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 99-106 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)
HC A14/MF A01; DFVLR, Cologne, DM 95,40

The flow behavior in the area of the floor of high speed ground transportation vehicles was calculated. For this calculation a simplified gap-corner-configuration formed by a U-formed finite sledge, which runs over an upright standing rail was introduced. The reduced system of differential equations, which describes the three-dimensional, laminar, compressible flow, led to an initial-boundary-value problem. To solve the system of equations an implicit finite difference scheme of alternating directions was developed. Because of the high gradients of the flow quantities in the corner areas the method of alternating directions was iterated additionally in each computational plane. The method of solution can be applied for high and for low Reynolds numbers. Author (ESA)

N79-12381# Technische Univ., Berlin (West Germany). Hermann-Foettinger-Inst. fuer Thermo- und Fluiddynamik.
SOLVING THE TWO-DIMENSIONAL NAVIER-STOKES EQUATIONS FOR FLOWS AROUND RANDOM BODY CONFIGURATIONS [DIE LOESUNG DER ZWEIDIMENSIONALEN NAVIER-STOKES-GLEICHUNGEN FUER STROEMUNGEN UM BELIEBIGE KOERPERKONFIGURATIONEN]
Werner Haase and Joachim Hindenberg *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 107-118 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)
Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

The two-dimensional, incompressible Navier-Stokes equations were approximated by finite difference methods using a Cartesian (x,y) grid of points. Even the use of non body-fitted coordinate systems allows the representation of arbitrarily shaped bodies. A discrete set of grid points was previously defined to be located on the surface where in the case of nonslip flow a zero velocity was indicated. The problems of flow about a circular cylinder were compared with experimental and numerical investigations of several authors. Author (ESA)

N79-12382# Technische Hochschule, Aachen (West Germany). Aerodyn. Inst.

PURE COUNTERCURRENTS IN ROTATING GASES [REINE GEGENSTROEME IN ROTIERENDEN GASEN]

Dieter Haenel and Gerhard Langbein (Urenco Ltd.) *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 119-123 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)

Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

The possibility of producing pure countercurrents, defined as currents in which the flows within two velocity version surfaces are constant so that there is no component across inversion surfaces, is discussed. A method to analyze pure countercurrents is presented. It is shown that pure axial flows with constant velocity cannot exist for a compressible fluid. ESA

N79-12383# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. fuer Angewandte Gasdynamik.

A PROCEDURE FOR THE CALCULATION OF BOUNDARY LAYERS IN FLOW SYMMETRY PLANES [EIN VERFAHREN ZUR BERECHNUNG VON GRENZSCHICHTEN IN STROEMUNGSSYMMETRIEEBENEN]

Ernst Heinrich Hirschel and Dieter Schwamborn *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 125-132 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)

Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

The foundations are given for an exact method for the calculation of quasi two-dimensional boundary layers in planes of flow symmetry at bodies. The boundary layer can be incompressible, laminar or turbulent (mixing-length model of R. Michel). The two-dimensional and the axisymmetric case are included. Longitudinal and transverse curvature of the contour can be taken into account, at the wall blowing or suction may occur, temperature or temperature gradient (heat transfer) can be prescribed. The solution of the governing equations is made by means of a finite difference method. A sample calculation is discussed. Author (ESA)

N79-12384# Gesamthochschule Essen (West Germany). Fachbereich Maschinentechnik.

ON IMPROVEMENTS OF THE DISSIPATION INTEGRAL METHOD FOR THE CALCULATION OF TURBULENT BOUNDARY LAYERS [UEBER VERBESSERUNGEN DER DISSIPATIONSINTEGRALMETHODE ZUR BERECHNUNG TURBULENTER GRENZSCHICHTEN]

Michael Jischa and Klaus Homann *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 133-138 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)

Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

The prediction of incompressible two-dimensional turbulent boundary layers is discussed. An integral method based on the momentum and the mean kinetic energy equation was developed. A third integral equation was added to calculate the dissipation integral. This equation was derived from the turbulent energy equation and takes into account the upstream history of the flow. Author (ESA)

N79-12385# Stanford Univ., Calif.

THE COMPUTATION OF SEPARATED DIFFUSER FLOWS

Stephen J. Kline and Sanjoy Ghose (IBM, San Jose, Calif.) *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 139-149 refs (For primary document see N79-12367 03-34)

Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

A summary of several recent researches in internal flows with separation is presented. Cases include incompressible, straight-walled channels with both laminar and turbulent boundary layers for plenum exit conditions. Fully developed separations were studied for both two-dimensional and axisymmetric flows. Successful computer programs for predicting such flows were constructed. A more advanced program was created that successfully predicts first-order flow quantities in channels with incipient and small amounts of separation. Emphasis is placed on why many earlier attempts to model separated flows have failed and how the difficulties can be corrected by appropriate modeling of the interaction between the pressure field of the outer flow and the blockage effects of boundary layers and separated zones. Author (ESA)

N79-12386# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Unternehmensbereich Apparate.

ON AN AEROBALLISTIC OPTIMIZATION [UEBER EIN AEROBALLISTISCHES OPTIMIERUNGSPROBLEM]

H.-G. Knoche *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 151-156 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)

Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

The accuracy of ballistic missiles, determined essentially by the aeroballistic properties of the missile itself, is discussed. The inherent dispersion characteristics of the ballistic missile at the end of the boost-phase due to the influence of thrust misalignment, launcher deflection, and cross-wind effects can be minimized by a suitable design of the missile's aerodynamic stability with the help of a time-dependent change of the stability. The effects of the exhaust plume and the longitudinal acceleration on aerodynamic stability are considered. Author (ESA)

N79-12387# Karlsruhe Univ. (West Germany). Bereich Feuerungstechnik.

VELOCITY AND CONCENTRATION PROFILES IN THE STABILIZATION REGION OF FREE JET FLAMES [GESCHWINDIGKEITS- UND KONZENTRATIONSPROFILE IM STABILISIERUNGSBEREICH VON FREISTRAHLFLAMMEN]

B. Lenze and R. Guenther *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 157-162 refs In GERMAN; ENGLISH summary Sponsored by Deut. Forschungsgemeinschaft (For primary document see N79-12367 03-34)

Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

For the calculation of injectors and of stabilization zones of turbulent diffusion and premixed flames the transition region and the mixing region with the potential core were taken into account. The measurements and simple calculations presented show the possibility of calculating the velocity and concentration profiles in the mixing and transition region of cold free jets by a Gaussian distribution. With these results stabilization zones at the base of a turbulent flame can be determined, provided the turbulent flame velocity is known. The mean value, not the local values, of the latter can be calculated beforehand. The method was applied to the calculation of the stabilization zones of an ethane flame. Author (ESA)

N79-12388# Naval Ship Research and Development Center, Bethesda, Md.

THE VORTEX CONCEPT IN THE HISTORY OF SCIENCE

Hans J. Lugt *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 163-170 refs (For primary document see N79-12367 03-34)

Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

Topics include the mythological era, art and vortices, the age of classical mechanics, and the impact on modern sciences. Since prehistoric times the vortex concept has been used as an explanatory principle to describe and interpret fundamental natural phenomena. In the study of the macrocosmos, the analysis of vortices was applied to solve cosmological problems, in particular to explain the evolution of the universe and the motions of celestial bodies. In studying the microcosmos, vortical behavior served as a mechanical model to support the idea of the atomic structure of matter. Both of these gigantic efforts throughout the greater part of human history fell short and ended at the beginning of this century with the rise of modern physics. The development and application of a vortex theory within the realm of classical mechanics have led the vortex concept to its biggest triumph and to a great technological success. Author (ESA)

N79-12389# Gesellschaft fuer Kernforschung m.b.H., Karlsruhe (West Germany). Inst. fuer Reaktorbauelemente.

FREE CONVECTION IN A WEDGE SHAPED GAP [FREIE KONVEKTION IM KEILSPALT]

U. Mueller *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 171-175

refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)
Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

A self-similar solution for the velocity and temperature field in the free convection flow in a wedge shaped gap is presented. It was assumed that the Boussinesq approximation was valid, that the medium was incompressible, and that dissipation could be neglected. The investigations were made for the geometrically simple case of a horizontal wall with constant temperature and an inclined wall with radially variable temperature. The inclination of the wall was limited to small angles. ESA

N79-12390# Kraftwerk Union A.G. Reaktortechnik, Erlangen (West Germany).

A TRANSFORMATION CONCEPT FOR THE CALCULATION OF TURBULENT COMPRESSIBLE BOUNDARY LAYERS [EIN TRANSFORMATIONSKONZEPT ZUR BERECHNUNG TURBULENTER KOMPRESSIBLER GRENZSCHICHTEN]

Wolfgang Neubert *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 177-183 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)
Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

Based on the friction coefficient c sub f - transformation of Van Driest and successfully used expressions for the incompressible turbulent velocity profile, a method is introduced to formulate a turbulent compressible velocity profile. In connection with the compressible integral relations of the boundary layer theory, a possibility to calculate the turbulent compressible boundary layer directly is presented. Author (ESA)

N79-12391# Karlsruhe Univ. (West Germany).

INTERFEROMETRIC INVESTIGATIONS ON SUPERSONIC JET NOISE [INTERFEROMETRISCHE UNTERSUCHUNGEN DES LAERMS VON UEBERSCHALLSTRAHLEN]

Herbert Oertel *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 185-190 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)
Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

Interference pictures and streak records taken with complementary double exposure were used for investigating the influence of supersonic jet characteristics on the speeds of those mixing layer structures which are accompanied by particularly long and straight Mach waves. Jets with data varied within large ranges were produced by means of a shock tube. Three preferred structure velocities were detected, the ratios of which to the ambient sound velocity are solely dependent on a given Mach number and sound speed ratio. The results are represented by simple formulas. Author (ESA)

N79-12392# Technische Univ., Berlin (West Germany). Hermann-Foettinger-Inst. fuer Thermo- und Fluiddynamik.

NUMERICAL SOLUTION OF THREE-DIMENSIONAL FLOW PROBLEMS BY MEANS OF FAST FOURIER TRANSFORMATION [DIE NUMERISCHE LOESUNG DREIDIMENSIONALER STROEMUNGSPROBLEME MIT HILFE DER FAST-FOURIER-TRANSFORMATION]

Franz Otte (Ges. fuer Controlling u. Wirtschaftsberatung mbH) and Frank Thiele *In its* Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 191-198 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)
Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

An efficient method for the time independent numerical calculation of incompressible three dimensional flows was developed. As a direct linear solution the fast Fourier transforms were used at each iteration for the nonlinear partial differential equations. The Navier-Stokes equations were formulated as equations for vorticity and velocity. The flow in a driven cavity with combined free and forced convection was calculated as an example. Author (ESA)

N79-12393# Technische Hochschule, Aachen (West Germany). Inst. fuer Allgemeine Mechanik.

THERMAL IGNITION IN BOUNDARY LAYERS

Norbert Peters *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 199-207 refs (For primary document see N79-12367 03-34)
Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

A simplified theory of homogeneous ignition based on the local description of the boundary layer equations is presented. An algebraic relation between the surface temperature theta sub w and the homogeneous Damkoehler number Da was derived which is identical to the formula derived by Waldman for the case of heterogeneous ignition. The stable and unstable parts of the S-shaped curve theta sub w = theta sub w (Da) were determined by a linear stability analysis. An education for the ignition temperature was derived and expanded for large values of the nondimensional activation energy. It is shown that the Seminov formula for the temperature rise is not restricted to zero order reactions but is the high activation energy limit for all values of the reaction order. The homogeneous Damkoehler number is related to Adomeit's ignition parameter psi which was obtained from the evaluation of experimental data. Author (ESA)

N79-12394# Centec G.m.b.H., Bensberg (West Germany).

AN ANALYTIC SOLUTION FOR THE ENRICHMENT OF URANIUM HEXAFLUORIDE IN LONG COUNTERCURRENT CENTRIFUGES

E. Raetz *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 209-214 refs (For primary document see N79-12367 03-34)
Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

An analytic solution for the enrichment and the separative power of long countercurrent centrifuges based on the Cohen equation and assuming an isothermal, mainly axial, flow except near the end caps, is described. Equations to obtain optimal operation parameters such as feed and feed input height were derived and solved. Author (ESA)

N79-12395# Technische Univ., Berlin (West Germany). Fachgebiet Bionik und Evolutionstechnik.

DRAG REDUCTION BY SURFACE TREATMENT WITH MACROMOLECULAR COMPOUNDS OF BODIES IMMERSED IN A FLUID FLOW [WIDERSTANDSVERMINDERUNG DURCH OBERFLAECHENBEHANDLUNG EINES STROEMUNGSKOERPERS MIT MAKROMOLEKULAREN SUBSTANZEN]

I. Rechenberg and P. Bienert *In its* Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 215-224 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)
Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

The influence of surface treatment on fluid flow drag was studied, using the Toms effect as a starting point. By adding not more than a few parts per million of long-chain molecules or microscopic small fibers to water, drag in turbulent flow may be reduced up to 70%. There is a limit to this technology if water flowing around the body-surface is renewed continuously. The adhesion technique is proposed as an alternative method to the additive technique: the turbulence reducing agent is adhering on the surface of the body. A biological model of this new technique: the mucous tissue of fish is discussed. Author (ESA)

N79-12396# Dornier-System G.m.b.H., Friedrichshafen (West Germany).

INTEGRAL METHOD FOR CALCULATION OF THREE-DIMENSIONAL TURBULENT INCOMPRESSIBLE BOUNDARY LAYERS [EINE INTEGRALMETHODE ZUR BERECHNUNG DREIDIMENSIONALER, TURBULENTER, INKOMPRESSIBLER GRENZSCHICHTEN]

H. W. Stock *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 225-236 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)
Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

An integral method using the momentum and entrainment equations in curvilinear, non-orthogonal coordinates is presented. The three-dimensional velocity profile was composed of profiles in the streamwise and crosswise direction. The two parameter profile family of Coles was applied for the streamwise direction which represents the velocity distribution in boundary layers in accelerated and decelerated flows very well. For the cross flow profiles the Mager and Johnston formulation was used. In the

method presented the lag entrainment idea was applied to overcome Head's correlation between the entrainment coefficient and a shape parameter, which is only valid for equilibrium boundary layers. Comparison with the experiments of van den Berg and Elsenaar, Johnston and Vermeulen is shown. Author (ESA)

N79-12397# Hochschule der Bundeswehr, Munich. (West Germany). Fachbereich Luft- und Raumfahrttechnik.

ON THE THERMODYNAMIC ENERGY LAW [ZUM ENERGIESATZ DER THERMODYNAMIK]

D. Straub, R. Waibel, and V. Lippig *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 237-243 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)

Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

Engineering thermodynamics deals with the concept of a system involving the energy transfer quantities heat and work. The distinction between heat and work may be expressed in their divergent relations to entropy. For open systems in particular, the concept of device may be applied to the definite identification of work. This concept is of analogous significance as the concept of wall for heat. Hence the consequences result in four statements about the energy theorem, by means of which, e.g., the derivation of the balance equations of continuum mechanics may be put on a new basis. Author (ESA)

N79-12398# Vereinigte Flugtechnische Werke-Fokker G.m.b.H., Bremen (West Germany).

INVERSE INTEGRAL METHOD FOR CALCULATION OF SEPARATED TURBULENT BOUNDARY LAYERS [EIN INVERSES INTEGRALVERFAHREN ZUR BERECHNUNG ABGELOESTER TURBULENTER GRENZSCHICHTEN]

P. Thiede *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 245-255 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)

Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

For the prediction of separated compressible turbulent two-dimensional boundary layers an inverse integral method was developed in which the surface pressure is defined as a dependent variable with either a prescribed displacement thickness or a prescribed streamline angle at the boundary layer edge. For the relations of the reverse flow velocity profiles similar solutions of Alber are used as a basis, and the history effects are considered by an empirical relation. The efficiency of the prediction method is appraised with tests in separated transonic flow. Author (ESA)

N79-12399# Technische Univ., Berlin (West Germany). Hermann-Foettinger Inst. fuer Thermo- und Fluiddynamik.

ANALYTICAL INVESTIGATIONS ON THE UNMIXEDNESS IN TURBULENT DIFFUSION FLAMES [ANALYTISCHE UNTERSUCHUNGEN ZUR UNGEMISCHTHEIT IN TURBULENTEN DIFFUSIONSFLAMMEN]

Frank Thiele *In its* Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 257-264 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)

Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

The phenomenon of unmixedness in turbulent diffusion flames is described by a simple model based on concentration fluctuations of the chemical species. Using the proposed model the combustion of an axisymmetric hydrogen jet in quiet air was calculated numerically under the assumption of local chemical equilibrium. The results are compared with experimental data. An essential influence of the unmixedness on the flow field is shown. Author (ESA)

N79-12400# Technische Universitaet, Munich (West Germany). Lehrstuhl fuer Stroemungsmechanik.

INTEGRAL REPRESENTATION OF ENERGY EQUATIONS IN FLUID MECHANICS [ZUR INTEGRALEN DARSTELLUNG DER ENERGIEGLEICHUNGEN DER STROEMUNGSMECHANIK]

E. Truckenbrodt *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 265-270 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)

Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

A critical comparison is presented between the energy equation in fluid mechanics (kinetic energy equation) and the energy equation in thermofluid mechanics (first law of thermodynamics) in their integral forms. Author (ESA)

N79-12401# Technische Univ., Berlin (West Germany). Hermann-Foettinger Inst. fuer Thermo- und Fluiddynamik.

COMMENTS ON MANUFACTURING AND APPLICATION OF HOT-WIRE PROBES IN THE FLOW LABORATORY [BEMERKUNGEN ZUR HERSTELLUNG UND ZUM EINSATZ VON HITZDRAHTSONDEN IM STROEMUNGSLABOR]

J. D. Vagt and A. Dahm *In its* Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 271-276 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)

Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

Improvements to hot-wire probes, used very frequently in experimental fluid mechanics, are presented. In the field of turbulence research in particular, there are hardly any other instruments which can be so widely used. Although the hot-wire technique has been developed over a long period, problems still arise due, for example, to the design and shape of the probe with respect to the flow. Some of these problems, which stem from the flow around the probe holder, wire arrangement, and vibrations are discussed. They can be solved by special design of the probes. Author (ESA)

N79-12402# Dornier-System G.m.b.H., Friedrichshafen (West Germany). Abt. fuer Theoretische Aerodynamik.

THEORETICAL INVESTIGATIONS ON THE SHOCK WAVE BOUNDARY LAYER INTERACTION IN CRYOGENIC NITROGEN [THEORETISCHE UNTERSUCHUNGEN ZUR STOSS-GRENZSCHICHT-WECHSELWIRKUNG IN KRYOGENEM STICKSTOFF]

Bernhard Wagner and Wolfgang Schmidt *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 277-287 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)

Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

The basic effects of low temperatures close to liquefaction in cryogenic wind tunnels were studied theoretically for viscous compressible flow on the basis of shock wave-laminar boundary layer interaction. The full Navier-Stokes equations in combination with the equations of state for a real gas and the material properties for low temperatures were solved by means of a finite volume method and MacCormack's time splitting technique. Results show relatively small deviations compared with the ideal gas case. The differences in the pressure distribution are caused mainly by real gas effects in the inviscid external flow field while the changes in the skin friction coefficient depend mainly on the different viscosity characteristics and on the real gas effects in the temperature distribution. Author (ESA)

N79-12403# Technische Univ., Berlin (West Germany). Inst. fuer Kerntechnik.

INVESTIGATIONS OF CAVITATION PHENOMENA IN PUMPS AND IN PIPES WITH DIAPHRAGM INLET USING RESONANCE DETECTORS [UNTERSUCHUNGEN VON KAVITATIONSPHAENOMENEN IN PUMPEN UND ABGEBLENDETEN ROHRLEITUNGEN MIT RESONANZDETEKTOREN]

U. Wesser and J. Klockgethter *In its* Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 289-296 refs In GERMAN; ENGLISH summary Sponsored by Ges. fuer Kernenergieverwertung in Schiffbau u. Schiffahrt (For primary document see N79-12367 03-34)

Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95,40

In fluid with high acoustic noise levels, resonance detectors were applied to measure cavitation phenomena in pumps. The analysis of the acoustic signals associated with the collapse of transient cavities leads to statistical parameters characterizing the cavitation state in the flow. The method is applicable even in the state of incipient cavitation. Some results for pumps and pipes are reported. Author (ESA)

N79-12404# Karlsruhe Univ. (West Germany). Inst. fuer Stroemungslehre u. Stroemungsmaschinen.

ON THE SOLUTION OF UNSTEADY TRANSONIC EQUA-

TIONS [ZUR INSTATIONAEREN LOESUNG DER TRANSSONISCHEN GLEICHUNGEN]
Juergen Zierep *In* Tech. Univ. Berlin Contrib. on Transport Phenomena in Fluid Mech. and Related Topics 12 Apr. 1977 p 299-302 refs In GERMAN; ENGLISH summary (For primary document see N79-12367 03-34)
Avail: NTIS HC A14/MF A01; DFVLR, Cologne, DM 95.40

The question under which conditions the solution of unsteady transonic flow equations leads to the steady state solution is discussed. Special interest is given to the limit case M infinite leads to 1. ESA

N79-12405# Pennsylvania State Univ., State College.
HORIZONTAL BUOYANCY EFFECTS ON THE PRESSURE DISTRIBUTION OF AN AXISYMMETRIC BODY OPERATING IN A CYLINDRICAL DUCT
G. C. Lauchle 1 Jun. 1978 41 p refs
(Contract N00017-73-C-1418)
(AD-A057397; TM-78-170) Avail: NTIS HC A03/MF A01 CSCL 20/4

It is well known that the static pressure coefficient values obtained from tests of axisymmetric bodies in, for example, a large water tunnel indicate the existence of tunnel wall interference. This interference is due to blockage experienced by the body operating within the boundaries of the test section walls, and to the skin friction on both the tunnel walls and the surface of the body, which in turn causes finite thickness boundary layers to develop. These factors result in a decrease in static pressure along the test section which leads to a spurious horizontal buoyancy on the body. Potential flow calculations can only account for solid blockage effects. A control volume analysis has thus been carried out from which pressure coefficient correction terms due to horizontal buoyancy have been obtained. They may be directly applied to any inviscid pressure distribution calculated for any given body operating a given tunnel. These correction factors are computed for a large, streamlined body operating over a range of velocities. They are applied to a theoretically-determined potential flow, in-tunnel body pressure distribution to obtain the viscous flow pressure distributions which are compared to those determined experimentally. GRA

N79-12406# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
ERRORS IN FINITE DIFFERENCE SOLUTIONS OF NAVIER-STOKES EQUATIONS
Sin-I Cheng 1978 13 p refs
(Contract N00014-75-C-0376)
(AD-A058322) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper is concerned with the accuracy of numerical solutions with coarse meshes of nonlinear partial differential equations, such as the Navier-Stokes. By presuming smooth, convergent difference approximations, some first differential analyses of the computational errors are carried out and an upper error bound of 0.03 Re(Delta x-squared) is recommended for second order accurate conservative difference schemes, computed at Re(Delta x) somewhat = 2. GRA

N79-12407# Lockheed Missiles and Space Co., Palo Alto, Calif.
STAGGERED SOLUTION PROCEDURES FOR DOUBLY ASYMPTOTIC FLUID-STRUCTURE INTERACTION ANALYSIS Final Report, 26 Apr. 1976 - 28 Feb. 1978
K. C. Park, C. A. Felippa, and J. A. DeRuntz 28 Feb. 1978 51 p refs
(Contract DNA001-76-C-0285)
(AD-A058305; AD-E300309; LMSC-D624324; DNA-4525F) Avail: NTIS HC A04/MF A01 CSCL 20/1

This report examines direct time integration techniques for the transient response analysis of fluid-structure interaction problems treated with the Doubly Asymptotic Approximation. Efficient solution of the equations of motion is achieved by a modular computer implementation in which separate fluid and structure analyzers are interfaced through extrapolation of the coupling terms. Because conventional realization of this technique is handicapped by severe time-increment limitations, a versatile formulation is developed that circumvents such limitations, achieving unconditional stability. Author (GRA)

N79-12408# Army Armament Research and Development Command, Aberdeen Proving Ground, Md. Ballistics Research Lab.
OSCILLATIONS OF A LIQUID IN A ROTATING CYLINDER. PART 1: SOLID-BODY ROTATION Final Report
C. W. Kitchens, Jr., N. Gerber, and R. Sedney Jun. 1978 47 p refs
(DA Proj. 1L1-61102-AH-02081)
(AD-A057759; AD-E430078) Avail: NTIS HC A03/MF A01 CSCL 20/4

For application to liquid-filled shell problems, the natural frequencies and decay rates of oscillations of liquids during spin-up in filled rotating cylinders are calculated. In this first part only the fully spun-up flow, i.e., solid-body rotation, is considered. Nevertheless, this part describes in detail the method of solution for the general case of spin-up, and presents results which check with experimental and previous theoretical data closely enough to confirm the reliability of the computational procedure. Data are shown which illustrate the variation of the eigenfrequencies of a disturbance mode with Reynolds number and aspect ratio of the cylinder. This work treats the viscous perturbation equations for flow of a rotating fluid. An eigenvalue problem results, defined by a sixth-order system which is integrated using the orthonormalization technique. Author (GRA)

N79-12409# Oak Ridge National Lab., Tenn. Instrumentation and Controls Div.
SALTY: A HYBRID COMPUTER PROGRAM FOR THREE-DIMENSIONAL HEAT TRANSFER FROM A DISCRETE SOURCE
R. S. Stone and O. W. Burke Jun. 1978 54 p refs
(ORNL-TM-6355) Avail: NTIS HC A04/MF A01

SALTY, a hybrid computer code, was written for calculation of the temperature distributions in an extended medium with spatially varying properties and one or more discrete energy sources. Such complex, multidimensional, time-dependent simulations constitute one useful application of the parallel computation and continuous integration capabilities of the analog-digital hybrid computer. An application of SALTY to a problem involving nuclear waste disposal in salt is described, and the results are compared to those from the pure digital code HEATING5. SALTY gives much the same results at a lower computer cost. Differences in the results are discussed. DOE

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N79-12410 Commonwealth Scientific and Industrial Research Organization, Aspendale (Australia). Div. of Atmospheric Physics.
AN AIRBORNE X-BAND MICROWAVE RADIOMETER
I. J. Barton and R. E. Meyer 1978 15 p refs
(ISBN-0-643-00314-2; CSIRO-34) Copyright. Avail: Issuing Activity

A null-balancing X-band microwave radiometer is described. The instrument was installed in a light aircraft and used to remotely measure soil moisture content in the near surface layer of unvegetated terrain. Author

N79-12411 Purdue Univ., Lafayette, Ind.
INFRARED HOLOGRAPHY USING THERMOCHROMICS Ph.D. Thesis
Jwing-Ming Yang 1978 180 p
Avail: Univ. Microfilms Order No. 7821524

The thermochromic Cuprous Mercuric Iodide, mixed with a suitable quantity of Polyurethane varnish coated onto a temperature controlled substrate, was used to record holograms at a wavelength of 10.6 micrometers. In order to understand the

thermal behavior of the detector, the specific heat and the thermal conductivity of the recording material(cuprous Mercuric Iodide + varnish) were measured and the steady state thermal characteristics of the detector were analyzed. Both the specific heat and the thermal conductivity proved significantly temperature dependent and demonstrated phase hysteresis. The thermal conductivity of the recording material increases by an order of magnitude during phase transition. Dissert. Abstr.

N79-12412 Colorado Univ. at Boulder.
THE ANALYSIS AND DESIGN OF InGaAsP AVALANCHE PHOTODETECTORS FOR OPERATION IN THE 918-1616 nM RANGE Ph.D. Thesis
Aicha Abdel Rahman Elshabini Riad 1978 191 p
Avail: Univ. Microfilms Order No. 7820550

The physical structure of the diode was made of a quaternary material InGaAsP grown on a heavily doped InP substrate by the liquid phase epitaxy technique. Mathematical analysis of the detector performance resulted in analytical expressions for the various device parameters. The parameters considered were the avalanche device multiplication, the noise power, the signal-to-noise power ratio, and the frequency response. The analytical expressions were solved for the above-mentioned parameters using numerical methods and detector structures. Simulation studies were performed in both the frequency and time domains. Transfer functions, impulse responses, and responses due to typical light input waveforms were developed. For technologically feasible structures the impulse response (baseline) duration was about 90 ps. Results show a tradeoff between response and noise performance. Dissert. Abstr.

N79-12413 California Univ., San Diego.
THE CONCEPT, DESIGN, AND OPERATION OF A DEMONSTRATION HOLOGRAPHIC RADIO CAMERA Ph.D. Thesis
William Ross Stone 1978 134 p
Avail: Univ. Microfilms Order No. 7823170

Knowledge of the spatial characteristics and distribution of the irregularities in the ionosphere is fundamental to an understanding of the scintillation of VHF and UHF radio signals from satellites. As a means of obtaining this information radio frequency holograms of the ionosphere were recorded using the Holographic Radio Camera technique, and computer reconstructions were obtained. Dissert. Abstr.

N79-12414*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AN ELECTRO-OPTIC, HIGH-VOLTAGE, TRANSIENT PROBE
Stephan J. Posta and Charles J. Michels Oct. 1978 13 p refs
(NASA-TM-79019; E-9588) Avail: NTIS HC A02/MF A01 CSCL 14B

A newly developed electro-optic voltage transducer is described. It is capable of measuring 30 ns rise time, floating or single-ended, 0 to 20 kV transients in a high noise environment such as a fast discharge laser or energetic switch system. The voltage transient is detected by a specially developed resistor in series with a light emitting diode. The light output (proportional to voltage) is transmitted remotely via a fiber-optic cable to a detector and recorder. Typical signals and comparison with commercial probe system signals are described. Author

N79-12415*# National Aeronautics and Space Administration, Washington, D. C.
USE OF COMPUTERS TO EXCLUDE THE INFLUENCE OF RADIOMETER INSTABILITY UPON MEASUREMENT RESULTS
S. L. Domnin, V. A. Yefanov, V. A. Korsenskiy, I. G. Moiseyev, and N. S. Nesterov Nov. 1978 12 p refs Transl. into ENGLISH from Izv. Krymskoy Astrofizicheskoy Observatorii (USSR), v. 57, 1977 p 199-204 Original language document was announced as A78-34770
(NASA-TM-75374) Avail: NTIS HC A02/MF A01 CSCL 14B

A radiometer, practically insensitive to great fluctuations in the equipment amplification coefficient, was developed by dividing the useful signal by a reference signal and modulating the two signals at different frequencies. The signals are simultaneously separated by corresponding synchronous detectors and recorded over two channels. The operation is simplified by replacing the continuous signals by a sampling of discrete values, and using a digital computer. The four steps involved in the process are described and a block diagram is included. This technique not only directly connects the radiometer with the computer, but also records all data provided by the control and signal channels. A.R.H.

N79-12416*# National Aeronautics and Space Administration. Pasadena Office, Calif.
METHOD AND MEANS FOR HELIUM/HYDROGEN RATIO MEASUREMENT BY ALPHA SCATTERING Patent Application
A. Bruce Whitehead (JPL) and Thomas A. Trombrello, inventors (to NASA) (JPL) Filed 7 Nov. 1978 18 p
(Contract NAS7-100)
(NASA-Case-NPO-14079-1; US-Patent-Appl-SN-958573) Avail: NTIS HC A02/MF A01 CSCL 14B

A cylindrically shaped enclosure has a source of alpha particles at one end and detectors mounted in tandem at the other end. Two downward-extending baffles and a blocking shield define a forward-scattering angular range in which scattering products from alpha particle/hydrogen and alpha particle/helium collisions can reach the detector's surface. The thickness of the detectors is sized so that alpha particles resulting from alpha particle helium collisions are absorbed in the first detector and recoil protons resulting from alpha particles/hydrogen collisions pass through the first detector and are absorbed by the second detector. Each scattering product is identified from to its ability to penetrate or not penetrate a detection material of predetermined thickness. The output pulses are processed by an electronic processing system. The apparatus could be carried by a planetary probe to one of the outer planets. NASA

N79-12417*# Control Technology Associates, Cupertino, Calif.
LABORATORY DEMONSTRATION OF AIRCRAFT ESTIMATION USING LOW-COST SENSORS Final Report
John A. Sorensen [1978] 84 p refs
(Contract NAS2-9382)
(NASA-CR-152049) Avail: NTIS HC A05/MF A01 CSCL 14B

Four nonlinear state estimators were devised which provide techniques for obtaining the angular orientation (attitude) of the aircraft. An extensive FORTRAN computer program was developed to demonstrate and evaluate the estimators by using recorded flight test data. This program simulates the estimator operation, and it compares the state estimates with actual state measurements. The program was used to evaluate the state estimators with data recorded on the NASA Ames CV-990 and CESSNA 402B aircraft. A preliminary assessment was made of the memory, word length, and timing requirements for implementing the selected state estimator on a typical microcomputer. G.Y.

N79-12418*# Pratt and Whitney Aircraft, East Hartford, Conn. Commercial Products Div.
INSTRUMENTATION FOR MEASURING THE DYNAMIC PRESSURE ON ROTATING COMPRESSOR BLADES Final Report
H. P. Grant and George A. Lanati Sep. 1978 182 p
(Contract NAS3-20296)
(NASA-CR-159466; PWA-5558-12) Avail: NTIS HC A09/MF A01 CSCL 14B

To establish the capability for measurement of oscillatory pressure on rotating blades, miniature fast response semiconductor strain gage pressure transducers (2mm x 0.33mm) were mounted in several configurations on thin titanium and steel compressor blades and subjected to pressure cycles from 1 to 310 kPa during static tests and spin tests. Static test conditions included 20 C to 150 C, 0 to 3000 tensile microstrain, -1000 to +1000 bending microstrain and + or - 650G vibration. The spin test conditions included 20 C to 82 C at 0 to 90,000G. Durability was excellent. Pressure transducer sensitivity changed by only a few percent over this range of environmental conditions. Noise signal due to oscillatory acceleration normal to the diaphragm was acceptable (0.33Pa/G). Noise signal due to oscillatory strain was acceptable (0.5 Pa/microstrain) when the transducer was mounted on a 0.05mm rubber pad, with a total buildup of 0.38mm on the measure surface. Back mounting or partial recessing to

eliminate buildup, increased the strain effect to 1.2 Pa/microstrain. Flush mounting within the blade to eliminate buildup reduced the strain effect, but required development of a special transducer shape. This transducer was not available in time for spin tests. Unpredictable zero drift + or - 14 kPa ruled out the use of these mounting arrangements for accurate steady-state (D.C.) measurements on rotating blades. The two best configurations fully developed and spin tested were then successfully applied in the NAS3-20606 rotating fan flutter program for quantitative measurement of oscillatory pressure amplitudes. Author

N79-12419*# Mississippi State Univ., Mississippi State. Dept. of Electrical Engineering.
A STUDY OF DIGITAL HOLOGRAPHIC FILTERS GENERATION. PHASE 2: DIGITAL DATA COMMUNICATION SYSTEM, VOLUME 1 Report, Mar. 1975 - Dec. 1978
Frank M. Ingels and Chung-Dau Mo Dec. 1978 184 p refs 2 Vol.
(Contract NAS8-31373)
(NASA-CR-150864; MSSU-EIRS-EE-79-1-Vol-1) Avail: NTIS HC A09/MF A01 CSCL 14E

An empirical study of the performance of the Viterbi decoders in bursty channels was carried out and an improved algebraic decoder for nonsystematic codes was developed. The hybrid algorithm was simulated for the (2,1), k = 7 code on a computer using 20 channels having various error statistics, ranging from pure random error to pure bursty channels. The hybrid system outperformed both the algebraic and the Viterbi decoders in every case, except the 1% random error channel where the Viterbi decoder had one bit less decoding error. L.S.

N79-12420# Naval Postgraduate School, Monterey, Calif.
SHIPBOARD STABILIZATION OF OPTICAL SYSTEMS M.S. Thesis
Robbie L. Williams Jun. 1978 43 p refs
(AD-A057900) Avail: NTIS HC A03/MF A01 CSCL 17/8

The control system for an existing shipboard gyrostabilized optic tracking platform was redesigned to achieve a longer tracking capability and improved tracking stability. The redesign increased the gain of the detector amplifier chain and improved the control system linearity. These modifications in conjunction with the addition of a mechanical viscous damper resulted in a three-fold increase in tracking range capability and significantly improved tracking stability and reliability. The maximum tracking range of the system was estimated to exceed 6000 meters. The system tracking uncertainty is approximately + or - 2.5 milliradians under 'sea state' 5 and is less than this under normal conditions. Author (GRA)

N79-12421# Airborne Instruments Lab., Deer Park, N. Y.
A 2.8 MICRON INFRARED HETERODYNE RADIOMETER Final Report
D. Yustein, J. Wolczok, and R. Lange Jan. 1978 30 p refs
(Contract F29601-76-C-0045)
(AD-A058266; AD-E200130; AFWL-TR-77-66) Avail: NTIS HC A03/MF A01 CSCL 17/5

A gain modulated, Dicke switched Infrared Heterodyne Radiometer (IHR) has been designed, developed, and tested which is capable of measuring the atmospheric absorption characteristics within a 200 MHz bandwidth about selected hydrogen fluoride (HF) laser transitions between 2.7 and 3.1 micrometers. The IHR has been installed in a KC-135 test aircraft. Provisions for remote control and remote calibration were incorporated into the radiometer. The heterodyne receiver sensitivity (NEP) of the IHR is 1.3 times 10 to the -19th power W/Hz and the calculated temperature resolution (delta T sub S/T sub S) is given for a variety of source temperatures and total transmittances (alpha). Author (GRA)

N79-12422# General Electric Co., Daytona Beach, Fla.
AIRBORNE ELECTRO-OPTICAL SENSOR SIMULATION SYSTEM Final Report, Jun. 1976 - Dec. 1977
Don Hayworth Aug. 1978 25 p
(Contract F33615-76-C-0059)
(AD-A058835; AFHRL-TR-78-41) Avail: NTIS HC A02/MF A01 CSCL 09/2

The effort as documented in this report describes the total system capability. This includes a description of all the special purpose and general purpose hardware comprising the Airborne Electro-Optical Sensor Simulation (AEOSS) System. The functional relationship between hardware portions is described together with interface to the software portion of the computer image generation. Supporting rationale for selection and arrangement of hardware is also provided together with a description of the data base region. Author (GRA)

N79-12423# Bureau of Radiological Health, Rockville, Md.
SURVEY OF PHOTOCOPIER AND RELATED PRODUCTS Final Report
Kenneth R. Envall and Eric J. Shangold Mar. 1978 75 p refs
(PB-283737/5; FDA/BRH-78/106;
DHEW/PUB/FDA-78/8060) Avail: NTIS HC A04/MF A01 CSCL 14E

Tutorial information on photocopier processes, definitions of common photocopier terms are provided, and information requested from 23 manufacturers is summarized. Over 400 different products are listed. This listing will provide information on lamp type, lamp function, lamp manufacturer and catalog number, number of lamps used in each product, lamp wattage, safety features, and spectral characteristics. Information on optical and other safety standards for products was not solicited in this survey. However, several manufacturers supplied information on safety features. GRA

N79-12424# Aerotherm Acurex Corp., Mountain View, Calif.
MEASUREMENT OF HIGH-TEMPERATURE, HIGH-PRESSURE PROCESSES Annual Report, Apr. 1976 - Jul. 1977
Larry Cooper Jan. 1978 265 p refs
(Contract EPA-68-02-2153)
(PB-284041/1; EPA-600/7-78-011) Avail: NTIS HC A12/MF A01 CSCL 14B

The first year's efforts under a planned 3 year program to develop measurement techniques for high-temperature, high-pressure (HTP) processes are reviewed. Several related topics are discussed in detail. GRA

N79-12496# Pavia Univ. (Italy). Ist. di Fisica.
TWIN PROBES FOR SPACE GEODESY
B. Bertotti *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 169-170 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

36 LASERS AND MASERS

Includes parametric amplifiers.

N79-12425 California Univ., Los Angeles.
FREE ELECTRON LASER: AN INTERACTION OF A RELATIVISTIC ELECTRON BEAM WITH A STATIC HELICAL MAGNETIC FIELD Ph.D. Thesis
Thomas Jun Tong Kwan 1978 215 p
Avail: Univ. Microfilms Order No. 7820245

The possibility of a new source of tunable coherent electromagnetic radiation was investigated theoretically and by computer simulation using a fully relativistic electromagnetic particle code which has one spatial and three velocity dimensions. By passing a relativistic electron beam through a static helical magnetic field, high frequency electromagnetic radiation is generated by its coupling to the negative energy electrostatic beam mode s through the helical magnetic field. If the wavelength of the helical magnetic field is lambda sub o, the wavelength of the radiation generated is roughly lambda sub o/2 lambda to 2d power where lambda is the relativistic factor corresponding to the velocity of the electron beam. By using this idea, one can theoretically make a laser which is continuously tunable by varying the beam volocity and/or the wavelength of the helical magnetic field. The process of generation of electromagnetic radiation in detail is studied. Dissert. Abstr.

N79-12426 California Univ., Los Angeles.
INVESTIGATION OF CW CO2 COAXIAL LASER

Ph.D. Thesis
Ken Tung-Tan Cheng 1978 126 p
Avail: Univ. Microfilms Order No. 7820197

A novel design for CW CO2 laser is presented. Lasing was achieved using a plasma as the active medium formed by a low-voltage discharge between a coaxial electrode configuration. The characteristic and the plasma parameters of the discharge are also studied. Dissert. Abstr.

N79-12427 Washington Univ., Seattle.
COLLISIONAL PROBLEMS IN INDUCED DIPOLE H2 LASER Ph.D. Thesis
Shimshon Alroy 1978 141 p
Avail: Univ. Microfilms Order No. 7820696

The results of experiments on collisional problems in a high pressure discharge, attempting to show the feasibility of a collision induced dipole H2 laser are reported. During collision with another molecule a dipole is induced allowing radiative transition for the duration of the collision. The excitation is done by an electron beam sustained discharge in high pressure mixture of H2/X where X represents Xe, Kr, or Ar. At E/N = 5 x 10 to the minus 17th power Vcm square about 60% of the charge energy is channeled to the upper laser state v = 1. The electron distribution function in H2, N2 and Mixtures of H2 and rare gases were solved numerically and the inverse bremsstrahlung absorption cross sections in discharges in these mixtures were computed for various wavelengths. Dissert. Abstr.

N79-12428 Cincinnati Univ., Ohio.
TRANSVERSE ELECTRICALLY EXCITED IODINE LASER Ph.D. Thesis
Ming Chung Wong 1977 79 p
Avail: Univ. Microfilms Order No. 7821601

Prompt laser emission of 100 ns FWHM on the I(2P1/2)-I (2P3/2) transition at 1.315 micrometers has been excited in a transverse electrical discharge. Iodine atoms in the upper and lower laser levels are generated by electron impact dissociation of i-C3F7I in He and UV photodissociation and/or anomalous diffusion mechanisms are shown not to be responsible for the observed emission. A kinetic model is presented which includes electron impact dissociation, attachment, collisional deactivation, ion-ion recombination, three-body iodine dimerization, and radical-atom recombination. Numerical results compare favorably with experimental data obtained in this work and published results using CF3I in nitrogen. Dissert. Abstr.

N79-12429 Texas Univ. at Dallas.
THEORETICAL MODELLING OF CHARGE TRANSFER LASERS Ph.D. Thesis
Joel Vincent Petersen 1978 120 p
Avail: Univ. Microfilms Order No. 7824323

A rate equation model was developed for the helium pumped nitrogen ion charge transfer laser. The model was able to quantitatively simulate many of the features of the laser that were observed experimentally: (1) temporal structure of the growth of the laser pulse; (2) steady state appearance of the 427.8 nm pulses; (3) self termination of the 391.4 nm pulses; (4) relative strengths of the 391.4 nm, 427.8 nm, and 470.9 nm pulses; and (5) narrowing of the spectral lineshape as the laser pulse develops. The simple model that was developed is applicable to a large class of lasers in which the spatial variation of the particle and radiation densities are relatively small and can be neglected. A quantitative model for pressure broadening of emissions in molecular ions was developed to describe the effect of very high pressures on the nitrogen ion laser spectrum. Dissert. Abstr.

N79-12430 Michigan Univ., Ann Arbor.
ABSORPTION AND FLUORESCENCE SPECTRUM OF OH STUDIED USING TUNABLE DYE LASERS Ph.D. Thesis
Dennis Karl Killinger 1978 145 p
Avail: Univ. Microfilms Order No. 7822933

Absorption and fluorescence studies of OH using dye lasers tuned to coincide with the rotational-electronic transitions of OH are reported. Specifically, the rotational and translational temperature of OH in a water-vapor discharge was measured. The relaxation phenomena of OH within the first excited electronic state was investigated along with the effect of saturation of the absorption transition due to the high laser intensity used for excitation. Dissert. Abstr.

N79-12431 California Univ., Davis.
ACCELERATION OF SOLID MACRO-PARTICLES BY LASER PRODUCED ABLATION Ph.D. Thesis
Thomas Edward McCann 1978 106 p
Avail: Univ. Microfilms Order No. 7822659

The feasibility of accelerating a macroparticle (BB) with laser light is studied. One and two dimensional Lagrangian hydrodynamic calculations are performed using the LASNEX magnetohydrodynamic computer code. The results of these calculations are then used to infer laser intensity, scaling laws for ablation pressure, and mass flow rate. In order to optimize the BB kinetic energy production efficiency, the ablation parameter scalings found from the LASNEX calculations are used in laser intensity temporal profile variation calculations. The optimized intensity profile from variation calculations increases the BB kinetic energy production efficiency by less tha 25% when compared to kinetic energy produced by an intensity which is constant in time. Dissert. Abstr.

N79-12432*# Illinois Univ., Urbana-Champaign. Radio Research Lab.
SPECKLE NOISE IN DIRECT-DETECTION LIDAR SYSTEMS
C. S. Gardner and G. S. Mecherle Apr. 1978 44 p refs
(Grant NsG 5049)
(NASA-CR-157936; RRL-Publ-495) Avail: NTIS HC A03/MF A01 CSCL 20E

The speckle noise is evaluated from some typical lidar systems. The governing equations are summarized. The mutual intensity function of the speckle pattern is calculated in terms of the laser radiation modes. Typical laser pulses are modeled and simplified expressions for the speckle noise power are derived. The signal-to-speckle-noise ratios for some proposed lidar systems are evaluated. G.Y.

N79-12433# Aerospace Corp., El Segundo, Calif. Aerophysics Lab.
PHASE CONTROL OF HF CHEMICAL LASERS FOR COHERENT RECOMBINATION
C. P. Wang and P. L. Smith 16 Oct. 1978 48 p refs
(ATR-78(8408)-2) Avail: NTIS HC A03/MF A01

A servo system for phaselocking two HF chemical lasers, operated on selected lines, was designed and simulated. A steady-state phase error is achieved that is adequate for coherent optical recombination. The results are based on the measured frequency drift of a small HF chemical laser and the measured frequency response of a piezoelectric transducer (PZT) mirror driver. A major innovation is the use of rate feedback with a laser Doppler sensor to extend the useful frequency response of the PZT driver. Closed-form expressions for the regulator gains derived by quadratic synthesis and state vector covariance are provided. Author

N79-12434# Naval Postgraduate School, Monterey, Calif.
MULTI STAGE Q-SWITCHED IODINE LASER M.S. Thesis
Jeffery Mark Perin Jun. 1978 90 p refs
(AD-A057904) Avail: NTIS HC A05/MF A01 CSCL 20/5

A two stage high energy iodine laser has been constructed using an existing oscillator stage that was modified so as to accept a Pockels cell and associated Brewster window stack for Q-switching. The output of the oscillator stage was then amplified by a second stage consisting of a 2.54 cm quartz lasing tube, 120 cm long and four flashlamps contained in an elliptical reflector. With 1180 Joules applied to the oscillator stage flashlamps, an output energy of 30 millijoules with a repeatability of two percent was achieved. Pulse duration measurements were detector limited. Estimates put the pulse duration at less than 100 nanoseconds. Applying 3580 Joules to the flashlamps of the amplifier stage and using the stated oscillator output resulted in an estimated output energy of 8.2 Joules with similar repeatability and pulse duration to that of the oscillator stage alone. For both stages the output beam profile was found to be Gaussian. GRA

N79-12435# United Technologies Research Center, East Hartford, Conn.

EVALUATION OF BASIC LASER WELDING CAPABILITIES Technical Report, Mar. 1977 - Jun. 1978
David B. Snow and Edward M. Breinan Jul. 1978 41 p refs
(Contract N00014-74-C-0423)
(AD-A058087; UTRC-R78/911989-14) Avail: NTIS HC A03/MF A01 CSCL 13/8

5456 and 5086 Aluminum alloys were welded at 1.2-7.2 cm/s with a continuous CO2 laser operated at beam powers of 5-9 kW. Difficulty was experienced in reproducing weld bead geometries and depths of penetration from weld to weld. Control of the helium shield gas flow rate and flow pattern were observed to be particularly critical for maintenance of full penetration of the fusion zone in both 0.64 and 0.95 cm plates. The 5456 alloy was found to be more easily welded than 5086, presumably because of the approximately 1% greater magnesium content of the 5456. Full penetration butt welds achieved with both alloys, but fusion zone drop through and weld bead porosity, in addition to consistency and reproducibility, remain as problems at this stage of the program. This report contains a detailed summary of the test welds produced and evaluation of these test welds to date. Author (GRA)

N79-12436# Massachusetts Inst. of Tech., Cambridge. Dept. of Earth and Planetary Sciences.
LASER RANGING AND VERY-LONG BASELINE INTERFEROMETRY FOR GEODETIC APPLICATIONS Final Report, 1 Jul. 1974 - 30 Sep. 1977
Irwin I. Shapiro and C. C. Counselman, III Feb. 1978 6 p refs
(Contract F19628-75-C-0058)
(AD-A058104; AFGL-TR-78-0057) Avail: NTIS HC A02/MF A01 CSCL 17/8

Three distinct tasks were undertaken to advance the application of space techniques to the measurement of geodetic parameters: error analyses were performed to estimate the accuracy with which the locations of satellite tracking stations and the motion of the earth's pole may be determined from laser-ranging observations of the LAGEOS satellite; a numerical model of the moon's rotation was developed to support the analysis of lunar laser ranging observations; and a very-long-baseline interferometry (VLBI) system was constructed and installed at the Onsala Space Observatory in Sweden for use in a program to monitor the earth's rotation through observations of extragalactic radio sources. The details of this work have been described in three previously published reports.
Author (GRA)

N79-12437# General Electric Co., Philadelphia, Pa. Re-entry and Environmental Systems Div.
INVESTIGATION OF GROUP 4-A METAL VAPOR GENERATION AND FLUX BEHAVIOR Final Report
J. A. Golden and P. D. Zavitsanos May 1978 40 p refs
(Contract F29601-76-C-0060; AF Proj. 1256)
(AD-A058306; AD-E200177; AFWL-TR-77-240) Avail: NTIS HC A03/MF A01 CSCL 20/5

The gas phase reactions of certain Group IV-A metals with N2O can give rise to electronically excited metal oxide species which have been considered candidates as active molecules for electronic transition chemical lasers. The objectives of this program were to obtain experimental data on selected Group IV-A metals as they pertain to the properties of the gas phase generation and transfer and also to devise practical schemes for developing a metal vapor generator which may permit an evaluation of their potential as laser pumping sources. GRA

N79-12438# Naval Research Lab., Washington, D. C.
AN INVESTIGATION OF A MAGNETRON INJECTION GUN SUITABLE FOR USE IN CYCLOTRON RESONANCE MASERS
J. L. Seftor, A. T. Drobot, and K. R. Chu Jul. 1978 33 p refs
(XF54581007)
(AD-A059163; NRL-MR-3697) Avail: NTIS HC A03/MF A01 CSCL 20/5

The requirements of an electron beam source suitable for use in cyclotron resonance masers are discussed. The beam source of preference, a temperature limited, magnetron injection gun, is studied by use of a numerical simulation code. This computer code includes the effect of external magnetic fields, the beam's azimuthal self magnetic field, and space charge in a self consistent manner. By use of this program, a prediction of gun operation, particularly as it affects gyrotron performance, can be made. Of particular interest are the effects of varying such control parameters as the magnitude of the electric and magnetic fields, the shape of the electric and magnetic fields, and the current. It is demonstrated that, for a particular optimized gun design, the gun operation is very sensitive to both the applied electric and magnetic fields at the cathode. However, the gun shows no strong dependence on other factors such as the temperature limited beam current or the magnetic field taper used to compress the beam. Author (GRA)

N79-12439# California Univ., Livermore. Lawrence Livermore Lab.
CIVILIAN APPLICATIONS OF LASER FUSION
J. Maniscalco, J. Blink, R. Buntzen, J. Hovingh, W. Meir, M. Monsler, and P. Walker 17 Nov. 1977 104 p refs
(Contract W-7405-eng-48)
(UCRL-52349) Avail: NTIS HC A06/MF A01

The commercial aspects of laser fusion were evaluated in an attempt to relate the end products (neutrons and energy) to significant commercial applications. It was found that by far the largest markets and highest payoffs for laser fusion are associated with electric power production. The prospects of producing commercial electricity with laser fusion was examined. A laser fusion concept, the liquid lithium waterfall reactor is described in detail. It was concluded that all three sources of electrical energy should be developed to the point where the final selections are primarily based on economic competitiveness. The other potential applications of laser fusion (fissile fuel production, synthetic fuel production, actinide burning, and propulsion) are also discussed, and a preliminary plan for the engineering development of laser fusion is presented. DOE

N79-12440# National Technical Information Service, Springfield, Va.
LASER WELDING. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Aug. 1978
William E. Reed Sep. 1978 256 p Supersedes NTIS/PS-77/0816
(NTIS/PS-78/0984/1; NTIS/PS-77/0816) Avail: NTIS HC $28.00/MF $28.00 CSCL 13H

Reports from worldwide research are cited which deal with the development of techniques and procedures for laser welding and with the characteristics of the resulting welds. Process control, automation, and applications are also investigated. Materials welded include stainless steels, dissimilar metals, titanium, ceramics, and plastics. GRA

N79-12441# National Technical Information Service, Springfield, Va.
ATMOSPHERIC EFFECTS ON LASER BEAMS, VOLUME 2. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1975 - Sep. 1978
Mona F. Smith Sep. 1978 216 p Supersedes NTIS/PS-77/0831; NTIS/PS-76/0843; NTIS/PS-75/670
(NTIS/PS-78/0992/4; NTIS/PS-77/0831; NTIS/PS-76/0843; NTIS/PS-75/670) Avail: NTIS HC $28.00/MF $28.00 CSCL 20F

The compilation cites recent research on laser beam transmission through the atmosphere. Studies on molecular attenuation, turbulence, thermal blooming, atmospheric window flows, atmospheric composition, aerosols, infrared lasers, computerized simulation, and water vapor are included. The effects of attenuation on optical radar, optical communications, and infrared detection are covered. GRA

N79-12111*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystems Section.
HYDROGEN MASER FREQUENCY STANDARD COMPUTER MODEL FOR AUTOMATIC CAVITY TUNING SERVO SIMULATIONS
P. D. Potter and C. Finnie *In its* The Deep Space Network 15 Oct. 1978 p 29-38 (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 20E

N79-12489# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
A PROPOSAL FOR THE DESIGN AND APPLICATION OF A HIGH-MOBILITY, LOW-COST SATELLITE LASER RANGING SYSTEM
P. Wilson, E. Silverberg (Texas Univ., Austin), R. Schutz (Texas Univ., Austin), and I. Malewich (Minsk Univ.) *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 111-117 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N79-12442 Drexel Univ., Philadelphia, Pa.
A DESIGN STUDY OF AN ANNULAR-JET CHARGE FOR EXPLOSIVE CUTTING Ph.D. Thesis
David John Leidel 1978 126 p
Avail: Univ. Microfilms Order No. 7822218

A design study of an annular-jet shaped charge for cutting a large diameter hole in a hard target was made. To achieve a successful design of the annular-jet shaped charge required the solution of two essential problems: the determination of the precision required in manufacturing the charge liner and explosive casting, and the matching of masses and collapse velocities from the two colliding walls. Based on this study, a precision linear shaped charge, a geometry very similar to, but simpler than the annular-jet charge, was designed. The problem of matching the masses and collapse velocities from the two liner walls of the annular-jet shaped charge was solved by utilizing a computer code, the Two-Dimensional Explosive/Mass Point computer code. It produced an annular-jet shaped charge design with desirable matching of liner wall masses and collapse velocities.
Dissert. Abstr.

N79-12443 Wisconsin Univ. - Madison.
FINITE ELEMENT ANALYSIS FOR GENERAL SOLIDS AND THREADED CONNECTIONS Ph.D. Thesis
John Lee Bretl 1978 196 p
Avail: Univ. Microfilms Order No. 7815399

An axisymmetric finite element analysis is used to model the load transfer in threaded connections. The thread zone is replaced by a layer of elements with orthotropic properties. The analysis is intended to yield the correct distribution of load along the threads and stresses in the mating parts away from the thread zone. Individual threads are not modeled by finite elements. Orthotropic directions in the thread elements depend on the direction of load. If the load direction is unknown the problem becomes iterative. Iteration is also needed for the case of tapered threads, because elements that represent threads not initially in contact have reduced stiffnesses. The effect of changing various parameters in a bolt-nut connection is examined. It is found that the uneven load distribution along the threads can be significantly improved by using any one of several special nut forms.
Dissert. Abstr.

N79-12444# Royal Aircraft Establishment, Farnborough (England).
NOISE ANALYSIS FOR EARLY FAILURE DETECTION IN FIXED INSTALLATION TURBOMACHINES AS A PROBLEM OF PATTERN RECOGNITION
Dieter Barschdorff, Wolfgang Hensle, and Bernhard Stuehlen Jun. 1978 25 p refs Transl. into ENGLISH from Tech. Messen (West Ger.), v. 44, pt. 5, 1977 p 181-189
(RAE-Lib-Trans-1984; BR64848) Avail: NTIS HC A02/MF A01

Condition monitoring of turbomachines is maintained by observing mechanical and thermodynamic parameters. The adapted methods of pattern recognition are able to supply additional information on machine performance and to support preventive failure detection. Some new methods of adapted techniques of measurement and signal analysis are discussed. The application on turbines in power plants is investigated. G.Y.

N79-12445*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SELF-STABILIZING RADIAL FACE SEAL Patent Application
I. Etsion, inventor (to NASA) (Technion Research and Development Foundation, Haifa, Israel) Filed 17 Nov. 1978 15 p Sponsored by NASA
(NASA-Case-LEW-12991-1; US-Patent-Appl-SN-961832) Avail: NTIS HC A02/MF A01 CSCL 11A

A self-stabilizing radial face seal is reported that consists of a primary seal ring juxtapositioned to a seal seat. The seal seat is provided with a porous ring-like circumferential structure which allows for the fluid pressure in the system to reach equilibrium. A cavity behind the porous ring provides a constant pressure reservoir.
NASA

N79-12446*# National Aeronautics and Space Administration. Pasadena Office, Calif.
AN IMPROVED SUSPENSION SYSTEM FOR A WHEEL ROLLING ON A FLAT TRACK Patent Application
Houston D. McGinness, inventor (to NASA) (JPL) Filed 17 Nov. 1978 25 p
(Contract NAS7-100)
(NASA-Case-NPO-14395-1; US-Patent-Appl-SN-961833) Avail: NTIS HC A02/MF A01 CSCL 13F

A suspension system is described which has particular utility as an azimuth bearing for large track-mounted antennas. The system comprises a wheel frame assembly including at least one uncrowned wheel connected in supporting relation with the assembly and adapted to be seated in rolling engagement with a flat truck, a load supporting bed, and a number of flexural struts interconnecting the bed and the assembly. Each of the struts is disposed in an inclined plane passing through the center of the uncrowned wheel surface along the line, substantially bisecting the line of contact established between the wheel surface and the track surface, and is characterized by a modulus of elasticity sufficient for maintaining the axis of rotation for the wheel in substantial parallelism with the line of contact.
NASA

N79-12447# Naval Ship Research and Development Center, Annapolis, Md. Propulsion and Auxiliary Systems Dept.
COMPARISON OF OPEN AND CLOSED BRAYTON ENGINES FOR RECUPERATED AND SIMPLE CYCLES
John S. Wohlgemuth Aug. 1978 48 p refs
(AD-A057921; DTNSRDC-PAS-78-15) Avail: NTIS HC A03/MF A01 CSCL 21/5

To quantitatively compare open and closed Brayton systems for their possible recuperated and simple cycle versions, a general performance analysis is developed. The results of this analysis are summarized in open and closed cycle design point performance maps. The maps present the performance output (such as cycle efficiency) over ranges of design values for the important cycle parameters of recuperation, gas turbine inlet temperature, and pressure ratio. For possible open and closed Brayton systems, cycle efficiency increases with either increasing values of recuperation or turbine inlet temperature, or both. To quantify these performance effects, the open and closed cycles are optimized with respect to pressure ratio.
GRA

N79-12448# Franklin Inst. Research Labs., Philadelphia, Pa.
DEVELOPMENT OF COMPLIANT-MOUNTED GAS-LUBRICATED JOURNAL BEARINGS WITH HIGH-SPEED, HIGH-LOAD CAPABILITY
W. Shapiro and R. Colsher Jul. 1978 64 p refs
(Contract N00014-78-C-0119)
(AD-A057791; FIRL-I-C4965) Avail: NTIS HC A04/MF A01 CSCL 13/9

The report describes the development of compliant-mounted or, more accurately, compliant-pivot journal bearings. Bearings of 1.4 inches and 1.8 inches in diameter (L/D = 1) operated without whirl at 76,000 rpm. An inadvertent test malfunction subjected the bearings to shock loading which they sustained without significant damage. The 1.4 inch diameter bearing was loaded to approximately 19 psi at 60,000 rpm when journal contact occurred. Overloading produced obvious bearing wipe, but the bearings was re-run without re-work and performed satisfactorily.
Author (GRA)

N79-12449# Iowa State Univ. of Science and Technology, Ames. Engineering Research Inst.
DEVIATION ANGLE/TURNING ANGLE PREDICTION FOR ADVANCED AXIAL-FLOW COMPRESSOR BLADE ROW GEOMETRIES Final Report, 1 Apr. 1976 - 30 Nov. 1977
George K. Serovy Dec. 1977 116 p refs
(Contract F33615-76-C-2090; AF Proj. 2307)
(AD-A057804; ISU-ERI-AMES-78196; TCRL-8; AFAPL-TR-77-81) Avail: NTIS HC A06/MF A01 CSCL 13/7

Axial-flow compressor design systems utilize experimentally-supported methods for estimation of fluid turning angles in individual blade rows. The three principal prediction methods now in use were developed during the period 1945 to 1960. There has been no substantial modernization of these procedures since 1960, while the methods have been widely applied to airfoil section profiles and in aerodynamic regions far outside the limits suggested by the original derivations and data correlations. GRA

N79-12450# Little (Arthur D.), Inc., Cambridge, Mass.
RECOMMENDED PERFORMANCE STANDARDS FOR ELECTRIC AND HYBRID VEHICLES
B. Underhill, P. Gott, and D. Hurter Sep. 1977 156 p
(EY-76-C-03-1335)
(SAN/1335-1) Avail: NTIS HC A08/MF A01

Minimum performance standards for electric and hybrid vehicles were developed. The standards cover passenger cars and commercial vehicles, with the latter having possible agricultural uses. The primary results cover performance parameters such as payload, acceleration time, top speed, range (both constant and on an SAE J227a schedule C cycle), maximum energy consumption, gradability, battery life, battery recharge time, safety standards, handling, weatherproofing, audio and radiation noise, and maintainability. DOE

N79-12120*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Tidbinbilla Deep Space Communications Complex.
AUTOMATED RADIO ASTRONOMY OPERATIONS
R. W. Livermore *In its* The Deep Space Network 15 Oct. 1978 p 94-97 (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 13I

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N79-12451 Washington State Univ., Pullman.
ON ANALYSIS OF THE LIFE LENGTH OF MULTIPLE COMPONENT COHERENT STRUCTURES Ph.D. Thesis
Juhn-Hsiong Uong 1978 100 p
Avail: Univ. Microfilms Order No. 7820130

The life length of multiple component structures sustaining time-dependent loads are examined under the assumption that the load acting on the structures is distributed to their constituent components in accordance with a structural load apportioning function. The case is considered when each structure sustains a single load. Two breakdown rules, proportional breakdown rule and power breakdown rule, are considered. Accordingly, two distributions are derived and their properties are developed. A chapter is devoted to structures sustaining multiple loads. It is assumed that the distribution of the loads to the components is governed by a column-stochastic matrix-valued function of the state vector. Only the proportional breakdown rule is considered. The final chapter deals with shock models and their properties. Dissert. Abstr.

N79-12452 Ohio State Univ., Columbus.
AN INVESTIGATION OF THE PHENOMENON OF FRETTING-WEAR AND ATTENDANT PARAMETRIC EFFECTS TOWARDS DEVELOPMENT OF FAILURE PREDICTION CRITERIA Ph.D. Thesis
Harvey Lyons 1978 335 p
Avail: Univ. Microfilms Order No. 7819631

Fretting-wear is a phenomenon that may occur whenever a mechanically-clamped joint exists in a dynamic environment. The distance which any two points on the joint bodies (not affected by local deformation) move towards each other under application of normal load is termed normal approach. Fretting-wear failure in terms of normal approach, would occur when the net movement between the intersecting joint bodies has produced a displacement sufficient to render the joint ineffective, thereby inducing functional failure. Interstitial entrapment of debris in smooth/smooth joints appeared to be a principal factor in crack development, as evident in metallographic and scanning electron microscopic studies. Parametric data suggest fretting-wear develops in three stages. Dissert. Abstr.

N79-12453*# Planning Research Corp., Washington, D. C.
ON-ORBIT SPACECRAFT RELIABILITY
Charles Bloomquist, Dennis DeMars, Winnifred Graham, and Particia Henmi 30 Sep. 1978 426 p
(Contract NASw-3041)
(NASA-CR-157427; PRC-R-1863) Avail: NTIS HC A19/MF A01 CSCL 14D

Operational and historic data for 350 spacecraft from 52 U.S. space programs were analyzed for on-orbit reliability. Failure rates estimates are made for on-orbit operation of spacecraft subsystems, components, and piece parts, as well as estimates of failure probability for the same elements during launch. Confidence intervals for both parameters are also given. The results indicate that: (1) the success of spacecraft operation is only slightly affected by most reported incidents of anomalous behavior; (2) the occurrence of the majority of anomalous incidents could have been prevented piror to launch; (3) no detrimental effect of spacecraft dormancy is evident; (4) cycled components in general are not demonstrably less reliable than uncycled components; and (5) application of product assurance elements is conductive to spacecraft success. G.G.

N79-12454# Army Concepts Analysis Agency, Bethesda, Md.
NONDESTRUCTIVE TESTING FOR FIELD WELDS: REAL TIME WELD QUALITY MONITOR Interim Report
Frank Kearney Aug. 1978 24 p refs
(DA Proj. 4A7-62719-AT-41)
(AD-A058129; CERL-IR-M-251) Avail: NTIS HC A02/MF A01 CSCL 13/5

This report describes part of a study to develop a field portable weld quality monitor. A real time weld quality monitor was configured and subjected to laboratory and field tests. Based on the tests, it was determined that the WQM design is adequate and has field applicability. Author (GRA)

N79-12455# Franklin Inst. Research Labs., Philadelphia, Pa.
OIL FILTER ANALYSIS TECHNIQUE RESEARCH PROGRAM Final Report, 25 Jun. 1976 - 31 Dec. 1977
Richard H. Hollinger Jul. 1978 64 p
(Contract DAAJ02-76-C-0038; DA Proj. 1F2-62209-AH-76)
(AD-A058241; USARTL-TR-78-18) Avail: NTIS HC A04/MF A01 CSCL 14/2

The objectives of this program were to select the most promising nondestructive test method for determining the quantity of iron in a 3 micron aircraft type oil filter, and to design, fabricate, and test two prototype field-usable units which utilized the method selected. Two prototype X-ray fluorescence analyzers were developed and tested. The analyzers detected iron with decreasing sensitivity to small increases in iron level up to 15 grams of iron on the test filters. In lower iron concentrations the sensitivity is shown to be 0.05 gram of iron over the entire filter. Author (GRA)

N79-12456# Systems Control, Inc., Palo Alto, Calif.
SYSTEM IDENTIFICATION METHODOLOGY FOR FAULT DETECTION AND ISOLATION IN DYNAMIC SYSTEMS Interim Report, 1 Jan. 1976 - May 1977
Narenda K. Gupta and W. Earl W. Hall 1 Feb. 1978 83 p refs
(Contract N00014-76-C-0420)
(AD-A059126; ONR-CR-215-245-2) Avail: NTIS HC A05/MF A01 CSCL 14/4

With the availability of inexpensive digital hardware, it has become practical to use advanced analytical techniques to achieve

fault tolerance in dynamic systems without significant increase in redundant hardware. Certain analytical techniques based on one or more Kalman filters have been proposed in the past. To achieve the best false/missed alarm probabilities, however, efficient techniques which extract all information from the data must be developed. This report first studies the conditions under which faults are detectable and distinguishable. It then outlines three major considerations in the development of fault detection approaches. These considerations are: (1) statistical criteria, (2) system modeling requirements, and (3) computer architecture. System identification techniques are then specialized to fault detection/isolation applications. In particular, methods for trading-off modeling complexity, statistical optimality and computer architecture are discussed. Author (GRA)

N79-12457# Army Tank-Automotive Research and Development Command, Warren, Mich.
REFERENCE RADIOGRAPHS FOR HEAVY ALUMINUM CASTINGS
Walter F. Wulf Jul. 1976 21 p
(AD-A059268; TARADCOM-TR-12169) Avail: NTIS HC A02/MF A01 CSCL 11/6

Two sets of standard reference radiographs were made from aluminum sand castings containing various types and degrees of internal flaws for use in controlling quality of aluminum castings 1 to 3 inches thick. The two sets were developed from master standards covering the thickness ranges 1 to 2 inches and 2 to 3 inches. Each set contains five grades of flaws commonly experienced in aluminum castings. Author (GRA)

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

N79-12458 Vanderbilt Univ., Nashville, Tenn.
COLUMN FLANGE BEHAVIOR IN BOLTED END PLATE MOMENT CONNECTIONS Ph.D. Thesis
Socrates Andrew Ioannides 1978 351 p
Avail: Univ. Microfilms Order No. 7819530

A linear elastic analytical model is presented that includes the interaction between the end plate and the column flange for both the tension and compression region. Higher order triangular finite elements are employed making it possible to predict the complex tension flange behavior. A simple contact problem solution technique is introduced and proven to converge. Convergence of the mode meshes is also investigated. An experimental test program is presented consisting of six tests, three with thin end plates and three with end plates of medium thickness. The general displacement behavior of the model and the stress behavior of the column flange are demonstrated with the aid of graphs; stereoscopic three-dimensional plots show the variation of these quantities over the total connection and two dimensional plots show the variation of the same quantities over the tension region. From all these plots the effect of the end plate thickness on the stiffness of the connection is clearly demonstrated. Dissert. Abstr.

N79-12459 Columbia Univ., New York.
CREEP AND STRAIN RECOVERY IN SILICON NITRIDE Ph.D. Thesis
Richard Michael Arons 1978 96 p
Avail: Univ. Microfilms Order No. 7819290

The uniaxial tensile creep and recovery behavior of a hot pressed silicon nitride as functions of time, stress and temperature was investigated. Creep response is characterized by parallel phenomena; one accouts for a persistent nonrecoverable plastic deformation and the other for a transient viscoelastic recoverable deformation. A model was developed for the creep and recovery behavior consistent with all experimental observations. Observed deformation is due to relative grain motion accommodated by a fluid grain boundary glass via liquid flow, and cavitation and wedge opening. The observed viscoelastic transient is explained by an elastic strain, controlled by flow of the grain boundary phase. Retardation times of this transient are dependent upon the viscosity of this glass phase and display the same temperature dependence as this viscosity. The persistent creep is in turn explained by grain boundary sliding which is accommodated by and rate controlled by both grain boundary phase flow and void opening. Dissert. Abstr.

N79-12460 North Carolina State Univ. at Raleigh.
PARTIAL CLOSURE OF A GRIFFITH CRACK LOCATED AT THE INTERFACE OF TWO BONDED DISSIMILAR ELASTIC HALF-PLANES Ph.D. Thesis
Joel Phillip Lehmann 1978 88 p
Avail: Univ. Microfilms Order No. 7820043

The problem of a Griffith crack located along the interface of two bonded dissimilar half-planes is considered. The crack is opened by uniform internal pressure, then partially closed by symmetric ties transverse to the crack and idealized by point loads in the materials. The effects of tie location and tie load on the crack surface displacement and on the stress intensity factors at the crack tips are investigated. Conditions for the removal of the singularities in the stresses at the crack tips and for closure at the center of the crack are investigated. Two cases of the partially closed crack are examined. In the first, stresses at the inner crack tips are finite, and necessary conditions for the existence of a solution are determined. In the second case, stress singularities exist at the inner crack tips, and stress intensity factors are found for the inner and outer crack tips. Certain special cases are examined in detail. Dissert. Abstr.

N79-12461 Clarkson Coll. of Technology, Potsdam, N.Y.
APPLICATION OF FINITE ELEMENT METHOD TO PROBLEMS IN FRACTURE MECHANICS Ph.D. Thesis
Jalees Ahmad 1978 358 p
Avail: Univ. Microfilms Order No. 7820456

Problems of plane stress and plane strain are solved by using a known crack tip element. A specialized crack tip finite element procedure for solving problems of out of plane bending of thin elastic plates containing cracks is developed, and its application is illustrated through several numerical examples. Extension of this technique in solving problems of thin elastic shells containing cracks is also suggested. The strain Energy Density Criterion of fracture is applied to determine the strain energy density factor and the direction of crack initiation for each numerical example presented in this thesis. In several numerical examples a comparison with known results is presented. The thesis contains lists of five computer programs written in FORTRAN IV. Dissert. Abstr.

N79-12462 Illinois Univ. at Urbana-Champaign, Urbana.
THE STABILITY OF A FINITELY DEFORMED CYLINDRICAL ORTHOTROPIC ELASTIC MEMBRANE AND THE EFFECT OF INTERNAL FLUID FLOW Ph.D. Thesis
Jacqueline Siu Kar Wong 1978 56 p
Avail: Univ. Microfilms Order No. 7821069

Some stability problems for finitely deformed elastic membranes are considered. The first part treats the stability of a stretched elastic membrane which is orthotropic in its reference state. The stability criteria for a uniformly deformed orthotropic plane sheet under conditions of dead loading are obtained. Stability criteria for a long tube are obtained and some numerical results are given through stability diagrams using strain energy functions appropriate for biological tissues. The effect of stability of the flow of an incompressible fluid through the tube is considered. Equations for the fundamental frequencies of vibration are derived. Dissert. Abstr.

N79-12463 Maryland Univ., College Park.
THE TRANSVERSE VIBRATORY RESPONSE OF PARTIALLY CONSTRAINED ELASTIC-VISCOELASTIC-ELASTIC BEAMS Ph.D. Thesis
Bruce Edward Douglas 1978 154 p
Avail: Univ. Microfilms Order No. 7824010

The dynamic effects of compressional and shear damping in the vibratory response of both fully constrained and partially constrained elastic-viscoelastic beams were investigated in a mechanical impedance format. Equations of transverse motion were derived for the fully constrained and partially constrained

compressionally damped three-layer laminate and solved using progressive wave methods where complex wave numbers were obtained. Results suggest the simple compressional damping mechanism is characterized by a relatively narrow frequency bandwidth centered at the compressional (delamination) frequency of composite. For three-layer damped beams where shear damping dominates for full coverage, the shear damping model was seen to break down in the low order modes when the constraining layer was shortened to partial coverage. Dissert. Abstr.

N79-12464*# Georgia Inst. of Tech., Atlanta. School of Engineering Science and Mechanics.
ELASTIC-PLASTIC FINITE ELEMENT ANALYSIS OF FATIGUE CRACK GROWTH IN MODE 1 AND MODE 2 CONDITIONS Final Scientific Report
Michihiko Nakagaki and Satya N. Atluri Nov. 1978 83 p refs
(Grant NsG-1351)
(NASA-CR-157620) Avail: NTIS HC A05/MF A01 CSCL 20K

Presented is an alternate cost-efficient and accurate elastic-plastic finite element procedure to analyze fatigue crack closure and its effects under general spectrum loading. Both Modes 1 and 2 type cycling loadings are considered. Also presented are the results of an investigation, using the newly developed procedure, of various factors that cause crack growth acceleration or retardation and delay effects under high-to-low, low-to-high, single overload, and constant amplitude type cyclic loading in a Mode 1 situation. Further, the results of an investigation of a centercracked panel under external pure shear (Mode 2) cyclic loading, of constant amplitude, are reported. Author

N79-12465# Dayton Univ., Ohio. Research Inst.
THE CHARPY IMPACT TEST AS A METHOD FOR EVALUATING IMPACT RESISTANCE OF COMPOSITE MATERIALS Technical Report, Sep. 1976 - Sep. 1977
Dennis C. Krinke, John P. Barber, and Theodore Nicholas Apr. 1978 44 p refs
(Contract F33615-76-C-5124)
(AD-A057967; UDRI-TR-77-54; AFML-TR-78-54) Avail: NTIS HC A03/MF A01 CSCL 11/4

A detailed analysis of the three point bend (Charpy Impact) test was conducted. A simple strength of materials approach to the prediction of specimen response was extended to include shear deformation, shear yielding and local loading tup deformation. Load-deflection, energy absorbed and failure modes were predicted for graphite-epoxy, and two types of boron-aluminum composites. Experiments were then conducted on these materials and the observations compared to the predictions. The analysis was unable to predict specimen response accurately, especially when significant shear deformation or yielding occurred. GRA

N79-12466# Minnesota Univ., Minneapolis. Dept. of Aerospace Engineering and Mechanics.
STRUCTURAL INELASTICITY 21: FINITE ELEMENT MODELS WITH VELOCITY DISCONTINUITIES
Hendrik M. VanRij and Philip G. Hodge, Jr. May 1978 111 p refs
(Contract N00014-75-C-0177)
(AD-A058086; AEM-H1-21) Avail: NTIS HC A06/MF A01 CSCL 20/11

Conventional finite-element models are based on displacement or velocity fields which are at least continuous. However, it is known that perfectly plastic materials may involve discontinuities of the tangential velocity component along certain lines. In this investigation, two two-dimensional finite element models are proposed which will allow for such discontinuities. GRA

N79-12467# Air Force Materials Lab., Wright-Patterson AFB, Ohio.
STATISTICAL ANALYSIS OF 112 GROUPS OF FATIGUE PERFORMANCE DATA: TESTING THE HOMOGENEITY OF THE SAMPLES Final Report, 15 Jan. - 15 Feb. 1974
Waloddi Weibull Apr. 1978 25 p refs
(AD-A058098; AFML-TR-78-28) Avail: NTIS HC A02/MF A01 CSCL 20/11

Three different tests for the hypothesis that the sample is homogeneous, denoted by MLE, OMLE and TI, are described, and their applications to 112 complete samples taken from an extensive list of fatigue performance data collected at the Boeing Company. The hypothesis of homogeneity was rejected for 60 of 112 examined samples by MLE, 45 of 107 samples by OMLE and 17 of 96 samples by TI. The number of samples for which the hypothesis was rejected at least by one of the tests was 64 to 112. The rejections are mainly due to high-time outliers, but in some cases to low-time outliers, which indicate two-component distributions. Author (GRA)

N79-12468# Lockheed-Georgia Co., Marietta.
EXTENDED STUDY OF FLAW GROWTH AT FASTENER HOLES, VOLUME 1 Final Report, 10 Jun. 1975 - 10 Jun. 1977
T. M. Hsu, W. M. McGee, and J. A. Aberson Apr. 1978 347 p
(Contract F33615-75-C-3099)
(AD-A057466; LG78ER0064-Vol-1; AFFDL-TR-77-83-Vol-1)
Avail: NTIS HC A15/MF A01 CSCL 20/11

An analytical and experimental investigation was conducted to characterize the fracture and cyclic-growth behavior of cracks emanating from various types of fastener holes, such as open, close-tolerance, interference-fit, and cold-worked fastener holes. An analytical approach was developed for estimating stress intensity factors for through cracks emanating from these types of fastener holes. Approximate stress intensity factors for quarter-elliptical cracks emanating from a corner of the same types of fastener holes were derived from corresponding through-crack solutions. Two alloy plates (2219-T851 aluminum and 6Al-4V (ELI) beta annealed titanium) with and without intentional initial flaws were tested under constant amplitude cyclic load and flight-by-flight fighter and bomber spectrum loads. Two initial flaw shapes corresponding to a quarter-circular corner crack and a through-the-thickness crack and three initial crack lengths (small, intermediate and large) were used in the test program. Three levels of cold working and interference and one level of fastener load transfer were included for each alloy. The amount of load transferred through the loaded fastener was maintained uniformly at the level which produced a bearing stress equal to the far-field stress. Correlations between calculated stress intensities and those reduced from fatigue crack growth data were good, except for very small cracks growing from the cold-worked holes. Also, the natural cracks initiated in the fatigue tests were most commonly corner and embedded types whose shapes corresponded quite closely to the quarter- and semi-elliptical shapes used in the analyses. Author (GRA)

N79-12469# Westinghouse Research and Development Center, Pittsburgh, Pa.
DEVELOPMENT OF STANDARD METHODS OF TESTING AND ANALYZING FATIGUE CRACK GROWTH RATE DATA Final Report, 20 Jun. 1975 - 17 Dec. 1977
S. T. Hudak, Jr., A. Safena, R. J. Bucci, and R. C. Malcolm May 1978 364 p refs
(Contract F33615-75-C-5064)
(AD-A058320; Rept-77-9D3-AFCGR-R1; AFML-TR-78-40)
Avail: NTIS HC A16/MF A01 CSCL 11/6

Results are presented which provide the basis for the development of an ASTM standard for generating, analyzing and presenting fatigue crack growth rate data. Comprehensive data were also obtained on the individual and combined effects of load ratio, cyclic frequency, test temperature and environment on fatigue crack growth rates in a 10Ni steel and a 2219-T851 aluminum alloy. These data are used to demonstrate the utility of the proposed test methods. A new mathematical representation of wide-range fatigue crack growth rate data is also proposed which has advantages over existing representations.
Author (GRA)

N79-12470# Minnesota Univ., Minneapolis. Dept. of Aerospace Engineering.
STRUCTURAL INELASTICITY XXII: A FINITE-ELEMENT MODEL FOR PLANE-STRAIN PLASTICITY
Philip G. Hodge, Jr. and Hendrick M. VanRij Jun. 1978 16 p refs
(Contract N00014-75-C-0177; NR Proj. 064-429)
(AD-A058276; AEM-H1-22) Avail: NTIS HC A02/MF A01 CSCL 20/11

A finite-element model is proposed which allows for both

straining within each element and slip between two elements. Basic equations are derived and are shown to almost completely uncouple into two constituent components: the conventional finite-element equations for continuous displacement fields and the 'slip' equations which were recently derived for a model based on slipping of rigid triangles. The model is applied to the Prandtl punch problem and is shown to combine the best features of its two constituents. Author (GRA)

N79-12471# Minnesota Univ., Minneapolis. Dept. of Aerospace Engineering and Materials.
STRUCTURAL INELASTICITY XX: FAILURE OF COMPOSITES
P. K. Sinha Jan. 1978 19 p refs
(Contract N00014-75-C-0177; NR Proj. 064-429)
(AD-A058274; AEM-H1-20) Avail: NTIS HC A02/MF A01 CSCL 11/9

A review of composite materials is presented. Primary emphasis is on fiber-reinforced composites. Particular attention is paid to various failure mechanisms in tension, compression, and shear. Existing results are summarized and suggestions are given for future research. Author (GRA)

N79-12472# Minnesota Univ., Minneapolis. Dept. of Aerospace Engineering and Mechanics.
STRUCTURAL INELASTICITY XIX: A REVIEW OF MOISTURE DIFFUSION IN COMPOSITES
P. K. Sinha Jan. 1978 18 p refs
(Contract N00014-75-C-0177; NR Proj. 064-429)
(AD-A058275; AEM-H1-19) Avail: NTIS HC A02/MF A01 CSCL 11/9

The effect of moisture diffusion in composite materials is reviewed. Pertinent equations are listed and various special solutions are given. Extensive references are quoted. Several suggestions are made for future research in the area.
Author (GRA)

N79-12473# New Jersey Inst. of Technology, Newark.
DYNAMICS OF SUBMERGED CYLINDRICAL SHELLS WITH ECCENTRIC STIFFENING Interim Report
Kerry Kier-Ten Chu, Michael Pappas, and Harry Herman Aug. 1978 77 p refs
(Contract N00014-75-C-0987)
(AD-A058218; NJIT-NV-13) Avail: NTIS HC A05/MF A01 CSCL 20/11

A theoretical analysis is presented for treating the free vibrations of submerged, ring stiffened cylindrical shells with simply supported ends. The effects of the eccentric stiffeners are averaged over the thin-walled isotropic cylindrical shell. The energy method is utilized and the frequency equation is derived by Hamilton's Principle. All three degrees of freedom are considered. Numerical results are presented for frequencies and mode separation for several cases of interest. Author (GRA)

N79-12474# New Jersey Inst. of Technology, Newark.
OPTIMAL DESIGN OF RING STIFFENED CYLINDRICAL SHELLS USING MULTIPLE FRAME SIZES Interim Report
Michael Pappas and Jacob Moradi Jul. 1978 28 p refs
(Contract N00014-75-C-0987)
(AD-A058231; NJIT-NV-14) Avail: NTIS HC A03/MF A01 CSCL 20/11

This report describes the solution to the singly reinforced discrete stiffener problem by direct use of an optimization scheme employing mathematical programming. The optimization formulation and procedure used here admit a large number of simultaneous buckling modes thus allowing optimization under conditions of mode coalescence, which are usual in this type of problem. This is a preliminary study, the purposes of which are; to develop and evaluate methodology for the treatment of this problem, to develop preliminary insights into how multiple frame sizes may efficiently be employed in submersible structures, to examine the nature of design improvement resulting from use of multiple size frames, and to investigate the nature of such optimal designs. Author (GRA)

N79-12475# Texas A&M Univ., College Station. Dept. of Aerospace Engineering.
STATUS REPORT OF AGGIE I COMPUTER PROGRAM
Walter E. Haisler Apr. 1978 29 p refs
(Contract N00014-76-C-0150)
(AD-A057789; TR-3275-78-2) Avail: NTIS HC A03/MF A01 CSCL 20/11

A status report of the AGGIE I structural analysis program is presented. AGGIE I is a computer program for predicting the linear and nonlinear, static and dynamic structural response of two- and three-dimensional continuum solids. The program is based on isoparametric finite elements and allows for two-dimensional plane stress, plane strain and axisymmetric analyses and general three-dimensional analyses. Large strain kinematics is based on the total Lagrangian formulation. Materially nonlinear models include several elastic-plastic, work-hardening models as well as an incompressible Mooney-Rivlin model. Included in this status report are several structural problems which have been investigated to verify the program. A listing of current program users is given. Also included is a summary of ongoing work which, when completed, will result in several improvements of the AGGIE I program. Author (GRA)

N79-12476# Texas A&M Univ., College Station. Dept. of Aerospace Engineering.
ELASTIC-PLASTIC-CREEP-LARGE STRAIN ANALYSIS AT ELEVATED TEMPERATURE BY THE FINITE ELEMENT METHOD
Walter E. Haisler and Duane R. Sanders 3 Apr. 1978 29 p refs
(AD-A057788; TR-3275-78-1) Avail: NTIS HC A03/MF A01 CSCL 20/11

This paper is divided into three parts. First, a review of currently available incremental theories of plasticity and creep constitutive models is given. Second, a formulation is presented for the non-isothermal, elastic-plastic-creep-large strain analysis by the finite element method. Third, results obtained with the AGGIE I computer program for several isothermal, elastic-creep and elastic-plastic analyses are presented. The present numerical results show good agreement with experimental and other numerical results. Author (GRA)

N79-12477# Systems Research Labs., Inc., Dayton, Ohio.
EVALUATION OF A CRACK-GROWTH GAGE FOR MONITORING POSSIBLE STRUCTURAL FATIGUE-CRACK GROWTH Final Report, May 1977 - Sep. 1977
N. E. Ashbaugh and A. F. Grandt, Jr. Feb. 1978 46 p refs
(Contract F33615-76-C-5191; AF Proj. 2307)
(AD-A058045; AFML-TR-77-233) Avail: NTIS HC A03/MF A01 CSCL 20/11

The results of an experimental and analytical investigation on the use of a precracked coupon mounted onto a structure for monitoring the effect of service loads upon fatigue crack growth in the structure are discussed. The precracked coupon of 'gage' is a simple device which provides a convenient means for determining the potential damage in a structure since the gage takes into account the mechanics of crack growth. Experimental results are reported for gages made from two aluminum alloys and having two types of crack geometries. These gages contained either a center crack or a single crack at the edge of a hole. The effect of the load amplitude upon the growth of the crack in the gage as a function of the crack growth in the structure was investigated. All tests were conducted under constant-amplitude cyclic load. The theoretical model is developed to predict the correlation between the growth of the cracks in the gage and in the structure. Two areas of major importance in the analysis are the load transfer from the structure through the ends of the crack gage and the crack-propagation law for the crack growth in the gage and in the structure. Comparison of the analyses and the experimental results is made.
Author (GRA)

N79-12478# Princeton Univ., N. J. Dept. of Civil and Geological Engineering.
LINE CRACK SUBJECT TO ANTIPLANE SHEAR
A. Cemal Eringen Jul. 1978 30 p refs
(Contract N00014-76-C-0240)
(AD-A059118; Rept-78-SM-8; TR-53) Avail: NTIS HC A03/MF A01 CSCL 20/11

Field equations of nonlocal elasticity are solved to determine the state of stress in a plate with a line crack subject to a

constant antiplane shear. Contrary to the classical elasticity solution, it is found that no stress singularity is present at the crack tip. By equating the maximum shear stress that occurs at the crack tip to the shear stress that is necessary to break the atomic bonds, the critical value of the applied shear is obtained for the initiation of fracture. If the concept of the surface tension is used, one is able to calculate the cohesive stress for brittle materials. Author (GRA)

N79-12479# Sydney Univ. (Australia). Civil Engineering Labs.

THE BEHAVIOR OF COMPOSITE COLUMNS UNDER LONG TERM LOADING

R. Q. Bridge May 1978 48 p refs

(PB-283976/9; R-321) Avail: NTIS HC A03/MF A01 CSCL 13M

Results are presented of an investigation into the influence of creep and shrinkage on the sustained load behavior of pin-ended composite columns. Tests were performed on built-up composite columns containing two steel channels without battens and encased in unreinforced concrete. The loads were sustained for periods up to four years. Basic creep and shrinkage tests, the results of which are reported, were carried out to provide data for the proposed analysis. The observed deformations with time were compared with theoretical predictions from an iterative inelastic analysis based on the rate of creep method. GRA

N79-12480# Sydney Univ. (Australia). Civil Engineering Labs.

LOCAL, DISTORTIONAL AND LATERAL BUCKLING OF I-BEAMS

Gregory J. Hancock Dec. 1977 50 p refs

(PB-283939/7; R-312) Avail: NTIS HC A03/MF A01 CSCL 13M

The finite strip method is used to study the local, distortional and flexural-torsional modes of buckling of I-beams bent about their major axis. The interaction between these modes is investigated. The buckling loads so determined are compared with those derived using the simpler but approximate theories normally used to design against specific buckling modes. The effect of lateral and torsional restraints on the buckling modes is investigated. A design chart for the local buckling stress of I-beams subjected to major axis moment is presented. GRA

N79-12481# Sydney Univ. (Australia). Civil Engineering Labs.

FINITE ELEMENT ANALYSIS OF THE LATERAL BUCKLING OF CONTINUOUSLY RESTRAINED BEAM-COLUMNS

G. J. Hancock and N. S. Trahair May 1978 40 p refs

(PB-283938/9; R-320) Avail: NTIS HC A03/MF A01 CSCL 13M

The typical members of steel industrial frame buildings are beam-columns, and these may be susceptible to lateral buckling. The finite element analysis presented by Barsoum and Gallagher is extended to allow for any combination of continuous restraints which are uniform along the element. At the same time a minor generalization is made to permit the analysis of monosymmetric beam-columns with moment gradient. A computer program based on this extended finite element analysis is described, and some indication of its power and accuracy is provided. GRA

42 GEOSCIENCES (GENERAL)

N79-12482# European Space Agency, Paris (France).

SPACE OCEANOGRAPHY, NAVIGATION, AND GEODYNAMICS

S. Hieber, ed. and T. D. Guyenne, ed. Apr. 1978 358 p refs Partly in ENGLISH and partly in FRENCH Proc. of European Workshop held at Schloss Elmau, West Ger., 16-21 Jan. 1978; co-sponsored by Council of Europe, European Assoc. of Remote Sensing Lab., and Working Party on Geodyn.

(ESA-SP-137) Avail: NTIS HC A16/MF A01

The medium and long term needs and requirements of Europe in the following fields were discussed and defined: applied geodesy, gravimetry, earth kinematics, dynamics and tectonics, magnetism, oceanography, ice dynamics, non-gravitational forces, navigation, time and frequency synchronization and dissemination, and very long baseline interferometry. Two main space programs to be undertaken with European effort were identified: a solid earth program intended to prepare a possible warning system for earthquake hazards; a surface studies program aiming at a global study of ocean and ice coverage. The following projects were also proposed: monitoring of changes in the earth's magnetic field; study of the earth's global radiative balance; development and testing of navigation systems. For individual titles, see N79-12483 through N79-12518.

N79-12483# National Bureau of Standards, Boulder, Colo. Joint Inst. for Laboratory Astrophysics.

SOME U.S. VIEWS ON SCIENTIFIC OPPORTUNITIES IN OCEAN AND EARTH DYNAMICS

Peter L. Bender *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 19-23 (For primary document see N79-12482 03-42)

Avail: NTIS HC A16/MF A01

Some of the areas of ocean dynamics and earth dynamics in which ESA participation would be strongly welcomed by earth scientists in the U.S. are discussed. The topics covered are ocean currents, tectonic plate motions, crustal movements in seismic zones, earth rotation and polar motion, and mapping of the gravity field. Cooperative international efforts in applying space techniques to these fields are likely to yield highly valuable scientific results, which later can be applied to practical problems in many countries. Particular needs for increased European participation are apparent in the laser tracking of Seasat-A, in setting up an international geodynamic control network, in developing accurate but inexpensive methods for detecting crustal movements at many points in seismic zones, in monitoring UT 1 and polar motion by both laser ranging and long baseline radio interferometry, and in developing a new gravity field mapping mission.

Author (ESA)

N79-12484# Centre National d'Etudes Spatiales, Toulouse (France). Groupe de Recherches de Geodesie Spatiale.

SATELLITE GEODESY AND NAVIGATION. PROPOSAL FOR A EUROPEAN PROGRAMME

M. Lefebvre, M. Schneider (Tech. Univ., Munich), S. Starker (DFVLR), and S. Hieber (ESA) *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 35-78 refs (For primary document see N79-12482 03-42)

Avail: NTIS HC A16/MF A01

The objectives which can be reached by space techniques in the fields of geodesy and navigation, of earth dynamics, as well as their interaction with other disciplines such as meteorology, glaciology, oceanography and climatology are identified. Research groups, laboratories and organizations already engaged in such activities or possible candidates for short and medium term European programs are discussed. Techniques or systems existing or under development, notably in Europe, are examined. A possible original European program is proposed. ESA

N79-12485# Technische Hogeschool, Delft (Netherlands).

ON POTENTIAL USES OF SPACE TECHNIQUES FOR APPLIED GEODESY c43

L. Aardoom *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 85-88 (For primary document see N79-12482 03-42)

Avail: NTIS HC A16/MF A01

The question of how space techniques and satellite techniques in particular could be used for applied geodesy is addressed and general aspects are considered. Current trends in space geodesy are reviewed. The European position to set out on a program of applied geodesy by means of space techniques is outlined. Author (ESA)

N79-12486# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).

SATELLITE TRACKING TECHNIQUES AND THEIR APPLICATIONS FOR GEODESY AND NAVIGATION c15

P. Wilson *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 93-97 refs (For primary document see N79-12482 03-42)

Avail: NTIS HC A16/MF A01

Measurement principles used for tracking near earth satellites, such as angular measurements, interferometry, range measurements and Doppler techniques are reviewed. The current status of ranging, Doppler and interferometry instrumentation is discussed and some thoughts on future trends are offered. ESA

N79-12487# Continental Shelf Inst., Trondheim (Norway).
FUTURE EUROPEAN CONTRIBUTIONS TO SPACE TECHNOLOGY AND THE EXPLORATION OF THE NORWEGIAN CONTINENTAL SHELF **c48**
Jan C. Blankenburgh *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 99-105 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

Several large-scale oceanographic, marine geodetic, and navigational problems on the Norwegian continental shelf which can probably only be solved satisfactorily and in an economical way by remote sensing techniques are discussed. Examples are given on existing needs and some suggestions are made for European contributions towards solutions which might become possible by utilizing space technology. Author (ESA)

N79-12488# Institut Geographique National, Paris (France).
PRESENT AND FORTHCOMING GEODETIC USES OF SPACE TECHNIQUES AT THE NATIONAL GEOGRAPHIC INSTITUTE, FRANCE **c43**
C. Boucher *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 107-109 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

The I.G.N. and its activities in the field of geodesy are presented, with emphasis on space techniques and Doppler satellite methods. An evolution schedule for products, techniques, and structures is presented, and proposals for experiments are made. Author (ESA)

N79-12489# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
A PROPOSAL FOR THE DESIGN AND APPLICATION OF A HIGH-MOBILITY, LOW-COST SATELLITE LASER RANGING SYSTEM **c36**
P. Wilson, E. Silverberg (Texas Univ., Austin), R. Schutz (Texas Univ., Austin), and I. Malewich (Minsk Univ.) *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 111-117 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

A dedicated laser with restricted ranging capability is proposed and some details of the possible design criteria are given. Evidence is presented for the need for such a system and the areas in which it could be applied with particular emphasis to regional geodynamical studies. Some cost estimates for the production and operation of such systems are given. Author (ESA)

N79-12490# Nottingham Univ. (England).
RETRIG AND EDOC: EUROPEAN TERRESTRIAL AND DOPPLER NETWORKS **c04**
V. Ashkenazi *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 119-125 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

The European Triangulation (RETrig) and the second European Doppler Campaign (EDOC-2) systems are discussed. The Helmert-Wolf block adjustment method is presented. The current state of RETrig is reviewed critically, drawing attention to the weak North Sea link and to other potential sources of systematic error. A brief description of the NAVSAT system and its own systematic model errors is given. A series of proposed comparisons between the EDOC results and the RETrig coordinates are listed, and a detailed procedure for a combined terrestrial-Doppler adjustment is described. Author (ESA)

N79-12491# Technische Hochschule, Darmstadt (West Germany). Inst. of Physical Geodesy.
THE PRESENT (1977) STATE OF THE ART IN GRAVIMETRY **c46**
E. Groten *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 131-136 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

The present situation in terrestrial and space gravimetry is reviewed for absolute gravity measurements, for relative high precision terrestrial gravity measurements. The spectrum of the stationary gravity field of the earth is discussed. Accuracies as presently feasible and desired with forthcoming projects on the one hand, and geodetic necessities on the other hand, are discussed. Open questions still inherent in present and future programs are outlined. Author (ESA)

N79-12492# Geodetic Inst., Charlottenlund (Denmark).
COLLOCATION AND LEAST SQUARES METHODS AS A TOOL FOR HANDLING GRAVITY FIELD DEPENDENT DATA OBTAINED THROUGH SPACE RESEARCH TECHNIQUES **c46**
C. C. Tscherning *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 141-149 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

Least squares adjustment and collocation methods for extracting gravity field information from data obtained through space research techniques (satellite orbit tracking, altimeter observations, Doppler determined positions) are discussed combining these data with data observed at the surface of the earth. The mathematical framework for the two models is described and the models are compared. It is shown that the two methods only become equivalent in cases where the number of parameters are equal to the numbers of observations. It is pointed out that several arbitrary choices (of parameters, weights, and norms) will have to be made before the methods can be applied, and that further investigations are needed in order to justify the specific choices. Author (ESA)

N79-12493# Technische Hochschule, Darmstadt (West Germany). Inst. of Physical Geodesy.
ON THE CONTROLLABILITY OF SPACEBORNE GRADIOMETRY BY TERRESTRIAL GRADIENTS **c46**
Guenter W. Hein *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 151-152 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

Possibilities for a control of the expected new gradiometers by the use of terrestrial gravity gradient data are discussed. Theoretical approaches are outlined and the test areas where real gravity gradient data are available are described.
Author (ESA)

N79-12494# Technische Universitaet, Munich (West Germany). Sonderforschungsbereich 78.
THE USE OF SATELLITE-TO-SATELLITE TRACKING FOR GRAVITY PARAMETER RECOVERY **c46**
R. Rummel, C. Reigber, and K. H. Ilk *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 153-161 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

The state of art of Satellite-to-Satellite Tracking (SST) as a method for the recovery of the medium and short wavelength features of the earth's gravity field is briefly discussed in comparison to satellite altimetry and gradiometry. The analysis of the basic equations connecting the measured radial velocities with the unknown parameters shows that by measuring some additional quantities, a self-contained SST low-low system would be feasible; the low-low configuration could in essence sense the gravity tensor in the direction connecting the two satellites; and the two satellites should orbit one above the other in radial direction. Severe problems for the realization of a low-low experiment are expected from the influences of non-gravitational forces and their proper compensation. The method of gravity parameter recovery implies two improperly posed problems, one of them the downward continuation to the surface of the earth. A hybrid regularization model for the proper treatment of this problem is compared with a sequential model. Some requirements for a SST experiment to be optimally suited for gravity parameter recovery are presented. Author (ESA)

N79-12495# Johann-Wolfgang-Goethe-Universitat, Frankfurt am Main (West Germany). Inst. fuer Meteorologie und Geophysik.

PLATE MOTIONS AND GRAVITY **c46**

W. R. Jacoby *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 163-167 refs (For primary document see N79-12482 03-42)

Avail: NTIS HC A16/MF A01

Two aspects of plate tectonics: instantaneous plate kinematics and plate dynamics are reviewed. The kind of observations needed to enhance the knowledge in these areas is dealt with. Instantaneous plate kinematics is as yet unknown. Monitoring in time the relative positions of stable mid-plate points to cm-accuracy and the strains in critical areas of plate margins is an important task of the future. Perhaps the most crucial information on plate dynamics is gravity, i.e. the potential and its derivatives in space and time. A unique test of numerical models of different types of convection will, however, not be possible. A number of simple aspects of convection demonstrate that the whole spectrum of the gravity field from less than 100 km wavelength onward is needed with mgal-accuracy. While local features are best obtained by ground observations, regional and global features require aid from satellites. Author (ESA)

N79-12496# Pavia Univ. (Italy). Ist. di Fisica.

TWIN PROBES FOR SPACE GEODESY **c35**

B. Bertotti *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 169-170 refs (For primary document see N79-12482 03-42)

Avail: NTIS HC A16/MF A01

The application of the twin probe method to eliminate the atmospheric drag is described. Two equal pairs of probes - each pair consisting of two passive, small and dense spheres of equal surfaces and different masses - are flown on a circular orbit at an altitude of about 300 km. Each pair determines the motion of an ideal point which feels only the gravitational forces. They are separated by a distance of 100 to 200 km and are tracked from, say, the Spacelab, flying at the same altitude, leading to a measurement of the fine scale structure of the gravity field. Author (ESA)

N79-12497# Geodetic Inst., Helsinki (Finland).

ON THE GRAVIMETRIC SURVEY OF THE GULF OF BOTHNIA **c46**

Juhani Kakkuri *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 171-173 refs (For primary document see N79-12482 03-42)

Avail: NTIS HC A16/MF A01

The activities of the Finnish Geodetic Institute with respect to the gravimetric survey of the Gulf of Bothnia are described. Topics include gravimetric experiments on the surface of the ice, gravity survey of the ice of the Bothnian Gulf and calibrating the satellite altimeter. ESA

N79-12498# Belgian Royal Observatory, Uccle.

EARTH KINEMATICS. GENERAL REVIEW OF NEEDS, TECHNIQUES AND FUTURE POSSIBILITIES **c46**

P. Paquet *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 181-187 refs (For primary document see N79-12482 03-42)

Avail: NTIS HC A16/MF A01

Needs, techniques, and future possibilities for the study of the diurnal earth rotation and motions of the axis of rotation are discussed. Reasons and needs to measure more precisely the earth angular position are given. Measurement techniques and accuracy available are discussed: astronomical methods; radioelectric technique - Doppler method; lunar laser ranging technique; and interferometric methods. ESA

N79-12499# Centre National d'Etudes Spatiales, Toulouse (France). Groupe de Recherches de Geodesie Spatiale.

EARTH'S VARIABLE RATE OF ROTATION AND POLAR WOBBLE **c46**

Anny Cazenave *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 189-197 refs (For primary document see N79-12482 03-42)

Avail: NTIS HC A16/MF A01

The geophysical causes of the earth's variable rate of rotation and polar wobble are reviewed. Possible consequence of future observational improvements are discussed. Topics include seasonal variations, Chandler wobble, and long period variations. Author (ESA)

N79-12500# Kiel Univ. (West Germany). Inst. fuer Geophysik.

WHAT KIND AND WHAT MAGNITUDE OF CREEP MOVEMENTS TAKE PLACE AT THE EARTH'S SURFACE? **c46**

R. Meissner *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 205-211 refs (For primary document see N79-12482 03-42)

Avail: NTIS HC A16/MF A01

Creep movements on the earth's surface, divided into global and regional patterns, are discussed. Average values of 10 to 20 cm/year occur for selected global profiles. An enhancement of these values might take place along special sections and at times of large decoupling earthquakes. Average regional creep rates of several cm/year may be found along prominent fault zones. Preseismic, coseismic, and postseismic creep generally are one order of magnitude higher than the average secular creep rate and may be concentrated at certain places along fault zones. Maximum coseismic creep reaches several meters, postseismic creep reaches several decimeters within some years. Author (ESA)

N79-12501# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).

REVIEW OF SATELLITE TRACKING TECHNIQUES PROBABLY CAPABLE OF MONITORING PLATE TECTONICS **c46**

D. Lelgemann *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 213-217 refs (For primary document see N79-12482 03-42)

Avail: NTIS HC A16/MF A01

The basic observation features and investigation techniques used in satellite geodesy and eventually capable of monitoring geotectonic motions are reviewed. Considering the physical information (time-, phase-, and frequency-differences) extracted from electro-magnetic signals, the principles of the observational methods (interferometry, ranging, and Doppler techniques) are described by which the geometrical information (angle, range, and range differences) needed to compute global or regional coordinates as a final result of geodetic efforts is obtained. The current status of some tracking systems, which may perhaps provide the superprecise information necessary for geotectonic investigations, is discussed. Author (ESA)

N79-12502# Uppsala Univ. (Sweden). Dept. of Solid Earth Physics.

THE MEASUREMENT OF LUNAR PALAEOTIDES AND THEIR IMPLICATION TO THE ORIGIN OF THE EARTH-MOON SYSTEM **c91**

A. J. Anderson *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 219-222 refs (For primary document see N79-12482 03-42)

Avail: NTIS HC A16/MF A01

A method of measuring palaeotides on the moon is presented. The probable cause of the mascons, based on earth-moon distances at the time of mascon formation is described. This is used to determine the early history of the earth-moon system. There are strong implications that the moon could not have been formed in orbit about the earth. Author (ESA)

N79-12503# Technische Hochschule, Darmstadt (West Germany). Inst. of Physical Geodesy.

GEODETIC HIGH PRECISION MEASUREMENTS IN ACTIVE TECTONIC AREAS **c46**

E. Groten and G. W. Hein *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 223-229 refs (For primary document see N79-12482 03-42)

Avail: NTIS HC A16/MF A01

The use of space borne laser ranging for monitoring the movements of retroreflectors installed along active tectonic zones together with a net of regionally distributed reflectors (at distances of more than 100 km) is discussed. It gives the opportunity to detect motion and movement in active zones with respect to more or less stable surroundings. The application in Iceland and Iran is considered. The difficulties encountered with terrestrial

methods when the same information is to be studied by classical geodetic approaches are outlined. Author (ESA)

N79-12504# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Geodesy.
ANALYSIS OF SATELLITE DATA FOR A STUDY OF CRUSTAL MOVEMENTS **c46**
A. Bjerhammar *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 231-233 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

Crustal movements in Sweden were studied. Studies by Jefferys indicate that there is a lack of correlation between the present crustal movements and the gravity field of the earth. In Fennoscandia, the geoidal heights are up to 50 m above the international ellipsoid but still there is a well documented crustal uplift. It is shown that, if the insignificant low order harmonics (below order 11) are excluded, then there is a geoidal subsidence well corresponding to the glaciation 10,000 years ago.
Author (ESA)

N79-12505# Newcastle-upon-Tyne Univ. (England). Inst. of Lunar and Planetary Sciences.
REVIEW OF SPACE STUDIES OF THE GEOMAGNETIC FIELD **c46**
S. K. Runcorn *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 241-243 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

The applications of existing satellites to a determination of the spatial and temporal variations of the geomagnetic field are discussed and the related geophysical processes which may be thus elucidated are listed. The launch of Magsat carrying a three component magnetometer should considerably improve models of the geomagnetic field compared with those based on satellite measurements of the total field. In addition, the finer resolution achieved will be valuable in studying permanent magnetization of the earth's crust. A case is made for a future low altitude satellite carrying a three component magnetometer.
Author (ESA)

N79-12506# Meteorological Office, Bracknell (England). Geophysical Fluid Dynamics Lab.
HOW TO LOCATE THE ELECTRICALLY-CONDUCTING FLUID CORE OF A PLANET FROM EXTERNAL MAGNETIC OBSERVATIONS **c91**
R. Hide *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 247-248 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

A new method is proposed for locating the electrically conducting fluid core of a planet from external magnetic observations. When tested with the aid of geomagnetic data, the method gives for the radius of the earth's liquid metallic core a value which differs insignificantly from the accepted value (based on seismic data). These findings have important implications for future investigations of the magnetic fields and internal structure and dynamics of the earth, Jupiter, and other magnetic planets. Author (ESA)

N79-12507# Groupe de Recherche de Geodesie Spatiale, Grasse (France).
NON GRAVITATIONAL FORCES ON AN ARTIFICIAL SATELLITE **c15**
F. Barlier *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 267-269 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

Possibilities to minimize the effect of non gravitational forces on the trajectory of an artificial satellite are discussed. The information one can obtain on the atmosphere total density, on radiation fluxes and on the radiation balance of the earth is dealt with. It is suggested that the development of a very sensitive microaccelerometer (10 to the minus 10th power m/sq. sec) can be very important in this field. ESA

N79-12508# Institut Royal Meteorologique de Belgique, Brussels.
UTILISATION OF A SUPER CACTUS ACCELEROMETER MOUNTED ON A SATELLITE FOR THE DIRECT OBSERVATION OF THE RADIATION BALANCE [UTILISATION D'UN ACCELEROMETRE SUPER CACTUS MONTE SUR UN SATELLITE POUR L'OBSERVATION DIRECTE DU BILAN RADIATIF] **c15**
D. Crommelynck *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 271-273 refs In FRENCH (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

The determination of the radiation balance of the system earth-atmosphere from radiation pressure measurements with a triaxial accelerometer onboard a satellite is considered in the context of research on the general air circulation and on climate variations. ESA

N79-12509# Technische Univ., Berlin (West Germany).
SOME ASPECTS FOR SPACE-BASED NAVIGATION SYSTEMS **c04**
P. Hartl *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 281-285 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

The application of space techniques to various fields of navigation is discussed. Special emphasis is given to a comparison between the earth based and satellite-based terrestrial navigation systems. It is shown that space techniques have some peculiar features which will be used for the first time in NAVSTAR-GPS with great benefits. Other concepts which might become of interest, are also discussed. Author (ESA)

N79-12510# Krupp Atlas-Elektronik, Bremen (West Germany).
MARINE NAVIGATION **c04**
Ingo Harre *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 287-288 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

Different methods of position determination on ships, with emphasis on radio navigational aids, are reviewed briefly. ESA

N79-12511# Istituto Elettrotecnico Nazionale (Galileo Ferraris), Turin (Italy).
TIMING VIA SATELLITES **c15**
S. Leschiutta *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 299-309 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

The current techniques of time synchronization via satellite are reviewed and compared with the ground-based methods. Future needs of science and technology for the time synchronization and dissemination are pointed out and the relevant uses of satellites are foreseen. Some European space programs in timing are discussed and some proposals for action are presented.
Author (ESA)

N79-12512# Observatoire de Paris (France). Lab. Primaire du Temps et des Frequences.
APPLICATION OF SPACE TECHNIQUES TO TIME AND FREQUENCY DISSEMINATION AND SYNCHRONIZATION **c70**
J. Rutman *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 311-316 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

The needs of the technical and scientific international community for time and frequency dissemination and synchronization techniques are discussed. The present terrestrial techniques and their limitations are reviewed, and the possibilities of space systems including artificial earth satellites are illustrated by a brief review of some past and present experiments. It is argued that some of the future European satellites should incorporate specific equipments for time and frequency applications as an additional payload. A particular system, the LASSO experiment (Laser synchronization of clocks), which has already been submitted to ESA, is described. Author (ESA)

N79-12513# Bureau International de l'Heure, Paris (France).
THE LINKS BETWEEN THE TIME SCALES **c70**
Michel Granveaud *In* ESA Space Oceanog., Navigation, and

Geodyn. Apr. 1978 p 317-319 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

Atomic time scales are reviewed. Any atomic time scale is established from the data of several clocks and the links between these clocks is an essential point. The present state of the used links is examined. Some future possibilities offered by satellites are outlined. Author (ESA)

N79-12514# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
SPACELAB EXPERIMENTS WITH ATOMIC CLOCKS c70
S. Starker *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 321-322 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

Possibilities and advantages of future satellite systems with atomic clocks are pointed out. Consideration of these systems in a European Space Program is recommended. In the beginning phase of planning and preparing operational systems of this kind, Spacelab gives a good opportunity for basic experiments. Several problems on this subject, which could be solved by Spacelab experiments, as well as existing proposals for performing those experiments, are mentioned. Author (ESA)

N79-12515# Istituto Elettrotecnico Nazionale (Galileo Ferraris), Turin (Italy).
SIRIO 1 TIMING EXPERIMENT c70
E. Detoma, S. Leschiutta, and G. Rovera *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 323-324 (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

The proposed Sirio 1 timing experiment is described. One- and two-way techniques will be evaluated via a geostationary telecommunication satellite on SHF bands. Author (ESA)

N79-12516# Netherlands Foundation for Radio Astronomy, Dwingelo. Radiosterrenwacht.
VERY-LONG-BASELINE-INTERFEROMETRY IN GEOPHYSICS, GEODESY AND ASTRONOMY c89
R. T. Schilizzi and J. Campbell (Bonn Univ.) *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 329-337 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

The Very Long Baseline Interferometry technique (VLBI) and its applications to both geophysical and astrophysical problems are reviewed. For the last ten years, VLBI has proved to be a powerful tool in the study of the physics of radio sources. In more recent times the technique has also been used for highly precise geodetic and astrometric studies. In principle centimeter accuracies can be achieved in determinations of baselines thousands of kilometers long, as well as accuracies of several milliseconds of arc in radio source positions. Information on the range of scientific problems that can be attempted with VLBI observations, as well as on current VLBI instrumentation in Europe and on prospects for its development is provided. In particular the use of a geostationary orbit satellite as a wide-bandwidth data link between outlying radio telescopes and a central data processing center is discussed. Author (ESA)

N79-12517# Astronomische Rechen-Institut, Heidelberg (West Germany).
ZERO-POINT DETERMINATION OF THE REFERENCE SYSTEM BY RADIO INTERFEROMETRY c89
H. G. Walter *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 339-340 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

Several approaches to the equinox determination of the radio reference system are treated. They all have in common the utilization of radio interferometric methods, especially of Very Long Baseline Interferometry (VLBI). It is concluded that radio interferometric observations of extragalactic radio sources have proved to be a powerful tool to establish a radio reference system at the 0.001 arcsec level. Author (ESA)

N79-12518# Sternwarte Bonn (West Germany).
ASTROMETRIC EXPECTATIONS c89
P. Brosche *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 341-342 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

Astrometric aspects of very long baseline interferometry via satellite including observations of extragalactic compact sources, observations of stars (especially FK 4 stars), dynamics of the planetary system and dynamics of the earth are briefly reviewed and some specific needs of the procedures involved are emphasized. Author (ESA)

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography*.

N79-12519 California Univ., Riverside.
THE DIGITAL USE OF LANDSAT DATA FOR INTEGRATED LAND RESOURCE SURVEY: A STUDY IN THE EASTERN MOJAVE DESERT, CALIFORNIA Ph.D. Thesis
Charles Frederick Hutchinson 1978 277 p
Avail: Univ. Microfilms Order No. 7821353

Systems of land classification were examined within the framework of classification logic. It was found that a priori or deductive, divisive systems of classification have some serious shortcomings and are often unable to meet the purpose for which they were designed. In general, a posteriori or inductive, agglomerative approaches to land classification were found to produce more satisfactory results. An inductive approach was adopted based loosely on landform. Three methods of digital multispectral classification of LANDSAT data were examined: supervised, unsupervised, and modified unsupervised. The last technique, in a qualitative sense, was judged to combine the best of the other systems by allowing some control in the selection of training areas which would allow representation of all terrain types felt to be of significance (as in supervised classification), but which also retained a significant amount of statistical objectivity (characteristic of the unsupervised approach).
Dissert. Abstr.

N79-12520 Rhode Island Univ., Kingston.
LATE CENOZOIC BIOSTRATIGRAPHY AND PALEOCEANOGRAPHY OF THE MEDITERRANEAN SEA Ph.D. Thesis
Robert Carl Thunell 1978 363 p
Avail: Univ. Microfilms Order No. 7820593

A series of quantitative studies of planktonic foraminifera in deep-sea sequences from the Mediterranean were used to reconstruct the Late Cenozoic (Miocene to Recent) paleoceanographic history of this region. Recent planktonic foraminiferal distributions were examined in 66 surface sediment samples from the Mediterranean Sea. In addition to mapping the frequency distribution of 16 species, the faunal data was subjected to cluster analysis, factor analysis and species diversity analysis. The clustering of species yields assemblages that are clearly temperature dependent. Factor analysis was used to delineate the geographic distribution of four faunal assemblages.
Dissert. Abstr.

N79-12521 Colorado State Univ., Fort Collins.
EFFECT OF ROUGHNESS AND ITS SPATIAL VARIABILITY ON RUNOFF HYDROGRAPHS Ph.D. Thesis
Yao-Huang Wu 1978 189 p
Avail: Univ. Microfilms Order No. 7820885

A three parameter model for hydraulic resistance is proposed by assuming a flow through a set of parallel random-width channels with equal water depth in the channels. Two parameter and three parameter models are used for optimization of model parameters. The results show that the three parameter model more precisely describes the relationship between the discharge, Q, and the equivalent water depth, h, for various kinds of roughness over a wide range of discharge than does the two-parameter model, Q = alpha H superscript m. Methods of estimation of the lumped parameters of the two parameter model are then developed

for watersheds composed of nonuniform roughness elements. Dissert. Abstr.

N79-12522 Colorado State Univ., Fort Collins.
A METHOD FOR PREDICTING THE IMPACT OF URBAN GROWTH ON FLOOD EXPECTANCY IN SOUTHEASTERN NEW ENGLAND Ph.D. Thesis
Mark Eliot Smith 1978 105 p
Avail: Univ. Microfilms Order No. 7820879

Data from 18 watersheds are used to develop a methodology whereby the change in discharge corresponding to both one and two percent annual exceedance probabilities may be predicted. A group of secondary data sources are employed to develop indices of urban land use change, surficial watershed properties and drainage network configuration. The dependent variable is derived from two separate estimates of flood expectancy which are found by standard analyses of nonoverlapping segments of a basin's hydrologic record. Multiple regression techniques yielded two equations corresponding to these two flood expectancies. The resultant models account for approximately 75 percent of the observed variation in the response, are statistically significant at the one percent level, and reproduce the observed values of the hydrologic indices with reasonable accuracy. Moreover, the urbanization index is by far the most important predictor, although the network parameter and the previous index contribute substantially to the model. Dissert. Abstr.

N79-12523 North Carolina State Univ. at Raleigh.
THE ECOLOGY OF FOUR COASTAL LAKES IN NORTH CAROLINA: TROPHIC STATES MEASURED FROM SPACE IMAGERY Ph.D. Thesis
Robert Edward Hollman, III 1978 187 p
Avail: Univ. Microfilms Order No. 7820032

The investigation was twofold. The first was to establish seasonal water quality changes occurring in Lake Mattamuskeet, Lake Phelps, New and Pungo Lakes of North Carolina, and the second was to ascertain if any water quality parameter(s) could be correlated with satellite imagery to form the basis of a trophic state monitoring system. From the wide variety of possible trophic state indicators, Secchi disc depth, total phosphorus, conductivity, and chlorophyll-a were found to be most useful. The four parameters provided the most efficient indices for determining eutrophication. The study demonstrates that the effectiveness and accuracy of the satellite monitoring system for shallow coastal lakes is dependent upon the interpreter's knowledge of the probable seasonal cycle of the lake and of the general lake environment. Dissert. Abstr.

N79-12524*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
ATMOSPHERIC TRANSFORMATION OF MULTISPECTRAL REMOTE SENSOR DATA Final Report, 2 Nov. 1976 - 1 Oct. 1977
Robert E. Turner, Principal Investigator Nov. 1977 128 p refs ERTS
(Contract NAS3-20483)
(E79-10006; NASA-CR-135338; ERIM-126100-3-F) Avail: NTIS HC A07/MF A01 CSCL 20F

The author has identified the following significant results. The effects of earth's atmosphere were accounted for, and a simple algorithm, based upon a radiative transfer model, was developed to determine the radiance at earth's surface free of atmospheric effects. Acutal multispectral remote sensor data for Lake Erie and associated optical thickness data were used to demonstrate the effectiveness of the atmospheric transformation algorithm. The basic transformation was general in nature and could be applied to the large scale processing of multispectral aircraft or satellite remote sensor data.

N79-12525*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
APPLICATION OF REMOTE SENSING TECHNOLOGY TO THE SOLUTION OF PROBLEMS IN THE MANAGEMENT OF RESOURCES IN INDIANA Semiannual Status Report, 1 Dec. 1977 - 31 May 1978
31 May 1978 65 p Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S. D. 57198 ERTS
(Grant NGL-15-005-186)
(E79-10008; NASA-CR-157900; LARS-070578) Avail: NTIS HC A04/MF A01 CSCL 02C

There are no author-identified significant results in this report.

N79-12526*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
FOREST RESOURCE INFORMATION SYSTEM Quarterly Report, 1 Apr. - 30 Jun. 1978
R. P. Mroczynski, Principal Investigator 30 Jun. 1978 43 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S. D. 57198 EREP
(Contract NAS9-15325)
(E79-10010; NASA-CR-151832) Avail: NTIS HC A03/MF A01 CSCL 02F

The author has identified the following significant results. Satisfactory results were obtained separately from both winter and spring LANDSAT data for areal estimates. Bitemporal results were improved by combining winter and spring data. Per-point and per-field classifiers performed comparably, except regarding time, where the per-field classifiers were more efficient.

N79-12527*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
SECONDARY ERROR ANALYSIS: THE EVALUATION OF ANALYST DOT LABELING
K. A. Havens, Principal Investigator Sep. 1978 17 p refs EREP
(Contract NAS9-15200)
(E79-10011; NASA-CR-151847; LEC-12380; JSC-14544) Avail: NTIS HC A02/MF A01 CSCL 05B

The author has identified the following significant results. From this examination of 25 test segments using AI labeling and ground truth labeling, the PCC on type 1 dots was found to be signficantly better for both types of ground truth labeled procedures than the PCC obtained using AI labeling. No significant difference in the PCC was found for type 2 dots. However, in all three treatments, the type 2 dots included pixels which fell on boundaries or were mixed pixels. This accounted for all PCC2 values being equally low. The proportion estimates achieved in these classifications showed no significant differences between procedures.

N79-12528*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
PROJECT GONDWANA: JUGARIBE-SB-24 [PROJETO GONDWANA: FOLHA JAGUARIBE-SB-24]
Nelson deJesusParada, Principal Investigator, Edison Crepani, Paulo Roberto Martini, and Roberto Pereira daCunha Aug. 1978 6 p refs In PORTUGUESE; ENGLISH summary Sponsored by NASA ERTS
(E79-10013; NASA-CR-157902) Avail: NTIS HC A02/MF A01 CSCL 05B

There are no author-identified significant results in this report.

N79-12529*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
REMOTE SENSING APPLIED TO SURVEYING THE THERMOMINERAL WATER REGION OF CALDAS NOVAS, GOIAS [SENSORES REMOTOS APLICADOS A PROSPECCAO DE AGUAS TERMOMINERAIS NO MUNICIPIO DE CALDAS NOVAS, GOIAS]
Nelson deJesusParada, Principal Investigator, Paulo Veneziani, and Celio Eustaquio dosAnjos Aug. 1978 11 p refs In PORTUGUESE; ENGLISH summary Sponsored by NASA ERTS
(E79-10014; NASA-CR-157903) Avail: NTIS HC A02/MF A01 CSCL 08H

There are no author-identified significant results in this report.

N79-12530*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
THE USE OF LANDSAT DATA FOR THE ESTABLISHMENT, CONTROL AND SUPERVISION OF PASTURE PROJECTS

IN THE SOUTHEAST AMAZON REGION

Nelson deJesusParada, Principal Investigator, Armando Pacheco dosSantos, and Evlyn Marcia Leao deMoraesNova Nov. 1977 19 p refs Presented at Simposio Internacional de Percepcion Remota Aplicada a Demografia y Uso Actual de la Tierra, Lapaz, Brazil, 28-30 Nov. Sponsored by NASA ERTS

(E79-10016; NASA-CR-157905) Avail: NTIS HC A02/MF A01 CSCL 02F

There are no author-identified significant results in this report.

N79-12531*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

RADIOMETRIC CORRECTION OF LANDSAT DATA

Nelson deJesusParada, R. Kumar, Principal Investigator, and L. A. Cavalcanti Oct. 1977 14 p refs Presented at 3d Seminaric Sobre Sistemas Espaciasis, Campos, Brazil, 26 Sep. - 4 Oct. 1977 Sponsored by NASA Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S. D. 57198 ERTS

(E79-10017; NASA-CR-157906) Avail: NTIS HC A02/MF A01 CSCL 05B

The author has identified the following significant results. The six independent sensors of the multispectral band scanner are supposed to be identical; however, in actual practice, they may have different gain settings and offset factors, which result in the effect known as stripping (black lines at regular intervals) of the imagery. A simple two parameter method to correct the gain settings and offset factors of each of the sensors with respect to one sensor, taken as reference, was developed. This method assumes: (1) the response of a detector varies linearly with the radiance of radiation received, and (2) the means, as well as the standard deviations, of a reasonably large number of pixels, in a given wavelength band, are equal for each of the detectors for the radiometrically corrected data.

N79-12532*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

DETERMINATION AND ERROR ANALYSIS OF EMITTANCE AND SPECTRAL EMITTANCE MEASUREMENTS BY REMOTE SENSING

Nelson deJesusParada, Principal Investigator and R. Kumar Sep. 1977 23 p refs Sponsored by NASA Submitted for publication ERTS

(E79-10021; NASA-CR-157910) Avail: NTIS HC A02/MF A01 CSCL 20N

The author has identified the following significant results. From the theory of remote sensing of surface temperatures, an equation of the upper bound of absolute error of emittance was determined. It showed that the absolute error decreased with an increase in contact temperature, whereas, it increased with an increase in environmental integrated radiant flux density. Change in emittance had little effect on the absolute error. A plot of the difference between temperature and band radiance temperature vs. emittance was provided for the wavelength intervals: 4.5 to 5.5 microns, 8 to 13.5 microns, and 10.2 to 12.5 microns.

N79-12533*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

STATISTICAL SEPARABILITY AND CLASSIFICATION OF LAND USE CLASSES USING IMAGE-100

Nelson deJesusParada, Principal Investigator, R. Kumar, and M. Niero Sep. 1977 17 p refs Sponsored by NASA Submitted for publication ERTS

(E79-10022; NASA-CR-157911) Avail: NTIS HC A02/MF A01 CSCL 05B

The author has identified the following significant results. The statistical separability of land use classes in the subsets of one to four spectral channels was investigated. Using ground observations and aerial photography, the MSS data of LANDSAT were analyzed with the Image-100. In the subsets of one to three spectral channels, channel 4, channel 4 & 7, and channels 4, 5, & 7 were found to be the best choices (ch.4 - 0.5 to 0.6 microns, ch. 5 - 0.6 to 0.7 microns, ch. 6 - 0.7 to 0.8 microns, and ch. 7 - 0.8 to 1.1 microns). For the single cell option of the Image-100, the errors of omission varied from 5% for the industrial class to 46% for the institutional class. The errors of commission varied from 11% for the commercial class to 39% for the industrial class. On the whole, the sample classifier gave considerably more accurate results compared to the single cell or multicell option.

N79-12534# Conservation Foundation, Washington, D. C.

PHYSICAL MANAGEMENT OF COASTAL FLOODPLAINS: GUIDELINES FOR HAZARDS AND ECOSYSTEMS MANAGEMENT

Dec. 1977 184 p refs Sponsored in part by EPA, Wash. D.C.

(PB-284164/1; NOAA-78060505) Avail: NTIS HC A09/MF A01 CSCL 13B

Development and conservation guidelines for the coastal floodplain are offered in this technical report. Focusing primarily on water systems and water-related aspects of the shoreland, guidelines for nine generalized 'places of concern' were developed. Conservation of coastal ecosystems is one of the two principal objectives of this report. This report deals only with the maintenance of natural defenses against storms and flooding. Characteristics and boundaries, ecological functions, natural resistance to hazards, environmental problems, potential management responses, and conservation guidelines and restoration techniques are discussed. GRA

N79-12535# Geological Survey, Columbus, Ohio. Water Resources Div.

WATER RESOURCES DATA FOR OHIO, WATER YEAR 1977. VOLUME 2: ST. LAWRENCE RIVER BASIN Annual Report, Oct. 1976 - Sep. 1977

May 1978 216 p

(PB-283552/8; USGS/WRD/HD-78/011; USGS/WDR/OH-77/2) Avail: NTIS HC A10/MF A01 CSCL 13B

Water resources data for the 1977 water year for Ohio consist of records of stage discharge, and water quality of streams; stage, contents and water quality of lakes and reservoirs; and water levels and water quality of ground water. This report in the two volumes, contains discharge records for 164 gaging stations, stage and contents for 32 lakes and reservoirs; water quality for 157 gaging stations, 69 partial-record stations and 54 wells; and water levels for 54 observation wells. Also included are 67 creststage partial-record stations and 65 low-flow partial-record stations. GRA

N79-12536# National Technical Information Service, Springfield, Va.

REMOTE SENSING OF AGRICULTURAL RESOURCES. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, Oct. 1973 - Sep. 1978

Audrey S. Hundemann Sep. 1978 217 p Supersedes NTIS/PS-77/0867; NTIS/PS-76/0714; NTIS/PS-75/668; NTIS/PS-75/068

(NTIS/PS-78/0969/2; NTIS/PS-77/0867; NTIS/PS-76/0714; NTIS/PS-75/668; NTIS/PS-75/068) Avail: NTIS HC $28.00/MF $28.00 CSCL 02D

Results of agricultural resources surveys using remote sensing techniques for crop identification, acreage measurement, land mapping, and forest density studies are discussed. A few abstracts pertain to identification of plant diseases and insect pests and fishery resources assessment. GRA

N79-12537# Intergovernmental Science, Engineering and Technology Advisory Panel, Washington, D. C. Natural Resource and Environment Task Force.

STATE AND LOCAL GOVERNMENT PERSPECTIVES ON A LANDSAT INFORMATION SYSTEM

Jun. 1978 281 p

(PB-284194/8) Avail: NTIS HC A13/MF A01 CSCL 08B

A LANDSAT Information system was examined to determine its value in the planning and management of natural resource utilization. Areas studied includes: need for natural resource data; value of LANDSAT to state and local governments; LANDSAT use by state, regional and local agencies; constraints to the states' use of LANDSAT; federal commitment to a LANDSAT information system; comprehensive and continuing technology transfer program; and need for continued research and development. GRA

N79-12538# Decker (James L.), Potomac, Md.
THE APPLICATION OF AIR CUSHION CONFIGURATIONS TO ICEBREAKING
James L. Decker Jul. 1978 208 p refs
(Contract MA-7-38036)
(PB-284011/4; MA-RD-940-78058) Avail: NTIS HC A10/MF A01 CSCL 13J

The cost and effectiveness of air cushion configurations in icebreaking applications with displacement ships in level ice fields was evaluated. Simple theoretical methods were developed for the prediction of the air cushion icebreaking capability in the low speed and high speed icebreaking modes. Conceptual designs for air cushion icebows and air cushion icebreakers were prepared and the economic analysis of their use with the displacement ships is reported. The self propelled air cushion icebreaker was determined to provide more flexible operational capability and was more cost effective for the cases examined. GRA

N79-12539# Technicolor Graphic Services, Inc., Sioux Falls, S. Dak.
A SELECTED BIBLIOGRAPHY: REMOTE SENSING APPLICATIONS FOR TROPICAL AND SUBTROPICAL VEGETATION ANALYSIS
Lawrence R. Pettinger Jul. 1978 50 p
(Contract DI-14-08-0001-16439)
(PB-284683/0) Avail: NTIS HC A03/MF A01 CSCL 02D

This bibliography contains 425 citations of selected technical reports, journal articles, and other publications covering the general subject of tropical and subtropical vegetation analysis. Functionally related topics that include vegetation analysis are included for completeness, and citations are organized under the following subheadings: remote sensing application overviews; vegetation (general); forestry; grasslands/savannah/shrublands; agriculture; land use/thematic mapping; and integrated surveys/multiple resource analysis/land systems. The terms 'tropics and subtropics' are used in the widest context to include applications related to a broad range of equatorial environments. GRA

N79-12485# Technische Hogeschool, Delft (Netherlands).
ON POTENTIAL USES OF SPACE TECHNIQUES FOR APPLIED GEODESY
L. Aardoom *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 85-88 (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12488# Institut Geographique National, Paris (France).
PRESENT AND FORTHCOMING GEODETIC USES OF SPACE TECHNIQUES AT THE NATIONAL GEOGRAPHIC INSTITUTE, FRANCE
C. Boucher *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 107-109 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N79-12540 Colorado State Univ., Fort Collins.
OPTIMAL CONTROL FOR SOLAR HEATED DWELLINGS Ph.D. Thesis
Dwight Ellsworth Hull, III 1978 114 p
Avail: Univ. Microfilms Order No. 7820855

Three optimal control problems are discussed. The first optimal control problem is to control the enclosure temperature in such a manner as to minimize the amount of fuel consumed. An analytical solution to this optimal control problem is presented. This optimal control strategy can be implemented in an actual heating system. The second optimal control problem is to control the collector fluid in such a manner as to maximize the difference between the useful energy collected and the energy consumed in pumping the collector fluid. An analytical solution to this optimal control problem is developed and the strategy can be implemented in an actual solar system. The third optimal control problem deals with a solar heating system. Dissert. Abstr.

N79-12541* National Aeronautics and Space Administration. Pasadena Office, Calif.
METHOD AND APPARATUS FOR MEASURING MINORITY CARRIER LIFETIMES AND BULK DIFFUSION LENGTH IN P-N JUNCTION SOLAR CELLS Patent
Oldwig vonRoos, H., inventor (to NASA) (JPL) Issued 24 Oct. 1978 8 p Filed 16 Dec. 1977 Supersedes N78-19608 (16 - 10, p 1324) Sponsored by NASA
(NASA-Case-NPO-14100-1; US-Patent-4,122,383; US-Patent-Appl-SN-861391; US-Patent-Class-324-20R; US-Patent-Class-324-22) Avail: US Patent and Trademark Office CSCL 10A

Carrier lifetimes and bulk diffusion length are qualitatively measured as a means for qualification of a P-N junction photovoltaic solar cell. High frequency (blue) monochromatic light pulses and low-frequency (red) monochromatic light pulses were alternately applied to the cell while it was irradiated by light from a solar simulator, and synchronously displaying the derivative of the output voltage of the cell on an oscilloscope. The output voltage is a measure of the lifetimes of the minority carriers (holes) in the diffused N layer and majority carriers (electrons) in the bulk P material, and of the diffusion length of the bulk silicon. By connecting a reference cell in this manner with a test cell to be tested in reverse parallel, the display of a test cell that matches the reference cell will be a substantially zero output. Official Gazette of the U.S. Patent and Trademark Office

N79-12542*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NONLINEAR DYNAMIC RESPONSE OF WIND TURBINE ROTORS Ph.D. Thesis - MIT
Inderjit Chopra Feb. 1977 233 p refs
(Grant NSF AER-75-00826)
(NASA-TM-78324) Avail: NTIS HC A11/MF A01 CSCL 10A

The nonlinear equations of motion for a rigid rotor restrained by three flexible springs representing the flapping, lagging and feathering motions are derived using Lagrange's equations for arbitrary angular rotations. These are reduced to a consistent set of nonlinear equations using nonlinear terms up to third order. Author

N79-12543*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
CHARACTERIZATION OF SOLAR CELLS FOR SPACE APPLICATIONS. VOLUME 4: ELECTRICAL CHARACTERISTICS OF SPECTROLAB BSF 200-MICRON HELIOS CELLS AS A FUNCTION OF INTENSITY AND TEMPERATURE
R. G. Downing and R. S. Weiss 1 Nov. 1978 38 p refs
(Contract NAS7-100)
(NASA-CR-157934; JPL-Pub-78-15-Vol-4) Avail: NTIS HC A03/MF A01 CSCL 10A

Electrical characteristics of Spectrolab BSF 200 micron Helios N/P silicon solar cells are presented in graphical and tabular format as a function of solar illumination intensity and temperature. Author

N79-12544*# Springborn Labs., Inc., Enfield, Conn.
ENCAPSULATION TASK OF THE LOW-COST SILICON SOLAR ARRAY PROJECT. INVESTIGATION OF TEST METHODS, MATERIAL PROPERTIES, AND PROCESSES FOR SOLAR CELL ENCAPSULANTS Annual Report
P. B. Willis, B. Baum, and R. A. White Jun. 1978 161 p Prepared for DOE
(Contracts NAS7-100; JPL-954527)
(NASA-CR-157939; DOE/JPL-954527-78/8) Avail: NTIS HC A08/MF A01 CSCL 10A

The results of an investigation of solar module encapsulation systems applicable to the Low-Cost Solar Array Project 1986 cost and performance goals are presented. Six basic construction

elements were identified and their specific uses in module construction defined. A uniform coating basis was established for each element. The survey results were also useful in revealing price ranges for classes of materials and estimating the cost allocation for each element within the encapsulating cost goal. The six construction elements were considered to be substrates, superstrates, pottants, adhesives, outer covers and back covers. G.Y.

N79-12545*# Rockwell International Corp., Anaheim, Calif. Electronic Systems Group.

ACCELERATED/ABBREVIATED TEST METHODS FOR PREDICTING LIFE OF SOLAR CELL ENCAPSULANTS TO JET PROPULSION LABORATORY CALIFORNIA INSTITUTE OF TECHNOLOGY FOR THE ENCAPSULATION TASK OF THE LOW-COST SOLAR ARRAY PROJECT Final Report, 25 Oct. 1977 - 30 Apr. 1978

J. M. Kolyer 30 Apr. 1978 297 p refs Sponsored in part by DOE

(Contract JPL-954458)

(NASA-CR-157944; DOE-JPL-954458-78/10) Avail: NTIS HC A13/MF A01 CSCL 10A

An important principle is that encapsulants should be tested in a total array system allowing realistic interaction of components. Therefore, micromodule test specimens were fabricated with a variety of encapsulants, substrates, and types of circuitry. One common failure mode was corrosion of circuitry and solar cell metallization due to moisture penetration. Another was darkening and/or opacification of encapsulant. A test program plan was proposed. It includes multicondition accelerated exposure. Another method was hyperaccelerated photochemical exposure using a solar concentrator. It simulates 20 year of sunlight exposure in a short period of one to two weeks. The study was beneficial in identifying some cost effective encapsulants and array designs. Author

N79-12546*# Northrop Research and Technology Center, Palos Verdes Peninsula, Calif.

LIFETIME AND DIFFUSION LENGTH MEASUREMENTS ON SILICON MATERIAL AND SOLAR CELLS Final Report, 16 Dec. 1976 - 31 Oct. 1977

Siegfried Othmer and Susan C. Chen 1978 94 p refs

(Contracts NAS7-100; JPL-954614)

(NASA-CR-157940; ERDA/JPL-954614-77/1; NRTC-77-42R) Avail: NTIS HC A05/MF A01 CSCL 10A

Experimental methods were evaluated for the determination of lifetime and diffusion length in silicon intentionally doped with potentially lifetime-degrading impurities found in metallurgical grade silicon, impurities which may be residual in low-cost silicon intended for use in terrestrial flat-plate arrays. Lifetime measurements were made using a steady-state photoconductivity method. Diffusion length determinations were made using short-circuit current measurements under penetrating illumination. Mutual consistency among all experimental methods was verified, but steady-state photoconductivity was found preferable to photoconductivity decay at short lifetimes and in the presence of traps. The effects of a number of impurities on lifetime in bulk material, and on diffusion length in cells fabricated from this material, were determined. Results are compared with those obtained using different techniques. General agreement was found in terms of the hierarchy of impurities which degrade the lifetime. G.G.

N79-12547*# National Aeronautics and Space Administration, Washington, D. C.

THE STIRLING ENGINE FOR VEHICLE PROPULSION

P. Kuhlman Nov. 1978 14 p refs Transl. into ENGLISH from VDI-Berichte (West Germany), no. 224, 1974 p 87-91 Original language document was announced as A75-23509 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-3199)

(NASA-TM-75442) Avail: NTIS HC A02/MF A01 CSCL 10A

The performance data of experimental Stirling engines are considered along with questions of exhaust-gas composition, engine noise, engine volume and weight, engine control, and the engine-starting process. The Stirling engine can use practically any liquid or gaseous fuel for its operation. It is found that technically a use of the Stirling engine in motor vehicles is feasible. Economic questions related to an introduction of the Stirling engine are discussed along with possible new developments which could improve the economic situation in favor of a use of Stirling engine. Author

N79-12548*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

MICROPROCESSOR CONTROL OF A WIND TURBINE GENERATOR

Arthur J. Gnecco and Gary T. Whitehead 1978 17 p Presented at the Conf. on Ind. Appl. of Microprocessors, Philadelphia, 20-22 Mar. 1978; sponsored by IEEE

(Contract E(49-26)-1028)

(NASA-TM-79021; E-9818; DOE/NASA/1028-78/20) Avail: NTIS HC A02/MF A01 CSCL 10B

A microprocessor based system was used to control the unattended operation of a wind turbine generator. The turbine and its microcomputer system are fully described with special emphasis on the wide variety of tasks performed by the microprocessor for the safe and efficient operation of the turbine. The flexibility, cost and reliability of the microprocessor were major factors in its selection. A.A.

N79-12549*# AiResearch Mfg. Co., Torrance, Calif.

PROTOTYPE SOLAR HEATING AND COOLING SYSTEMS Monthly Progress Reports, 1 Apr. - 30 Jun. 1978

Jul. 1978 81 p Prepared for DOE

(Contract NAS8-32091)

(NASA-CR-150829) Avail: NTIS HC A05/MF A01 CSCL 10A

A collection of monthly status reports are given on the development of eight prototype solar heating and cooling systems. This effort calls for the development, manufacturing, test, system installation, maintenance, problem resolution, and performance evaluation. The systems are 3-, 25-, and 75-ton size units. G.Y.

N79-12550*# Martin Marietta Corp., Denver, Colo.

DEVELOPMENT OF SINGLE-CELL PROTECTORS FOR SEALED SILVER-ZINC CELLS Final Report

John W. Lear, Richard L. Donovan, and Mathew S. Imamura Nov. 1978 68 p refs

(Contract NAS3-19432)

(NASA-CR-159407; MCR-78-571) Avail: NTIS HC A04/MF A01 CSCL 10C

Three design approaches to cell-level protection were developed, fabricated, and tested. These systems are referred to as the single-cell protector (SCP), multiplexed-cell protector (MCP). To evaluate the systems 18-cell battery packs without cell level control were subjected to cycle life test. A total of five batteries were subjected to simulate synchronous orbit cycling at 40% depth of discharge at 22C. Batteries without cell-level protection failed between 345 and 255 cycles. Cell failure in the cell level protected batteries occurred between 412 and 540. It was determined that the cell-level monitoring and protection is necessary to attain the long cycle life of a AgZn battery. The best method of providing control and protection of the AgZn cells depends on the specific application and capability of the user. Author

N79-12551*# AiResearch Mfg. Co., Los Angeles, Calif.

PROTOTYPE SOLAR HEATING AND COOLING SYSTEMS Monthly Progress Reports

Oct. 1978 70 p Prepared for DOE

(Contract NAS8-32091)

(NASA-CR-150830) Avail: NTIS HC A04/MF A01 CSCL 10A

A collection of monthly status reports on the development of eight prototype solar heating and cooling systems is presented. The effort calls for the development, manufacture, test, system installation, maintenance, problem resolution, and performance evaluation. The systems are 3, 25, and 75 ton size units. G.Y.

N79-12552*# AiResearch Mfg. Co., Torrance, Calif.

PROTOTYPE SOLAR HEATING AND COOLING SYSTEMS Monthly Progress Reports, 1 Jan. 1978 - 31 Mar. 1978

Apr. 1978 25 p Prepared for DOE

(Contract NAS8-32091)

(NASA-CR-150828) Avail: NTIS HC A02/MF A01 CSCL 10A

Eight prototype systems were developed. The systems are 3, 25, and 75-ton size units. The manufacture, test, installation, maintenance, problem resolution, and performance evaluation of the systems is described. Size activities for the various systems are included. S.B.S.

N79-12553*# United Technologies Corp., East Hartford, Conn. Power Systems Div.
DEVELOPMENT OF ADVANCED FUEL CELL SYSTEM Final Report, 25 Feb. - 31 Dec. 1976
B. Gitlow, A. P. Meyer, W. F. Bell, and R. E. Martin 6 Jun. 1978 74 p refs
(Contract NAS3-19778)
(NASA-CR-159443; FCR-0398) Avail: NTIS HC A04/MF A01 CSCL 10A

An experimental program was conducted continuing the development effort to improve the weight, life, and performance characteristics of hydrogen-oxygen alkaline fuel cells for advanced power systems. These advanced technology cells operate with passive water removal which contributes to a lower system weight and extended operating life. Endurance evaluation of two single cells and two, two-cell plaques was continued. Three new test articles were fabricated and tested. A single cell completed 7038 hours of endurance testing. This cell incorporated a Fybex matrix, hybrid-frame, PPF anode, and a 90 Au/10 Pt cathode. This configuration was developed to extend cell life. Two cell plaques with dedicated flow fields and manifolds for all fluids did not exhibit the cell-to-cell electrolyte transfer that limited the operating life of earlier multicell plaques. Author

N79-12554*# General Electric Co., Philadelphia, Pa. Space Div.
MINI-BRAYTON HEAT SOURCE ASSEMBLY DEVELOPMENT Final Report, 27 Jun. 1974 - 1 Oct. 1978
D. Wein and W. F. Zimmerman 1 Nov. 1978 306 p refs
(Contract NAS3-18541)
(NASA-CR-159447; Doc-78SDS4252) Avail: NTIS HC A14/MF A01 CSCL 10A

The work accomplished on the Mini-Brayton Heat Source Assembly program is summarized. Required technologies to design, fabricate and assemble components for a high temperature Heat Source Assembly (HSA) which would generate and transfer the thermal energy for a spaceborne Brayton Isotope Power System (BIPS) were developed. B.B.

N79-12555# National Aviation Facilities Experimental Center, Atlantic City, N. J.
ALTERNATIVE ENERGY SOURCES FOR FEDERAL AVIATION ADMINISTRATION FACILITIES Final Report, May 1976 - Jan. 1978
Lane G. Hinkley, George C. Apostolakis, and Arthur H. Bonello Aug. 1978 121 p refs
(FAA Proj. 081-431-100)
(AD-A058681; FAA-NA-77-17; FAA-RD-78-87) Avail: NTIS HC A06/MF A01 CSCL 10/2

The feasibility of using photovoltaics, wind, fuel cells, and thermoelectric/thermionic generators to provide electrical energy at Federal Aviation Administration facilities was investigated. As the result of a literature and industry/government search and two questionnaires, it was recommended that the agency (1) proceed to establish alternative energy demonstration sites in order to gain experience in the design, implementation, and operation of such systems; (2) expend some level of effort in continuing the literature/industry/government search initiated under this project in order to remain current on the subject; and (3) establish a centralized data collection and tabulation point for energy requirements/consumption/cost data on a facility basis. A.R.H.

N79-12556*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MSFC HOT AIR COLLECTORS Final Report
Kenneth Anthony Oct. 1978 32 p refs
(NASA-TM-78206) Avail: NTIS HC A03/MF A01 CSCL 10A

A description of the hot air collector is given that includes a history of development, a history of the materials development, and a program summary. The major portion of the solar energy system cost is the collector. Since the collector is the heart of the system and the most costly subsystem, reducing the cost of producing collectors in large quantities is a major goal. This solar collector is designed to heat air and/or water cheaply and efficiently through the use of solar energy. G.G.

N79-12557*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SATELLITE POWER SYSTEM (SPS) ENVIRONMENTAL IMPACTS, PRELIMINARY ASSESSMENT
Floyd R. Livingston 1 Apr. 1978 26 p refs Sponsored by NASA
(NASA-CR-157952; JPL-900-822) Avail: NTIS HC A03/MF A01 CSCL 10A

Present power plant assessment factors are used to present satellite power system (SPS) impacts. In contrast to oil, gas, nuclear and coal fueled power plants, the SPS and hydroelectric power plants produce air, water, and solid waste emissions only during the construction phase. Land use impacts result from the placement of rectennas used for microwave receiving and rectifying. Air quality impacts of the SPS resulting from the construction phase amount to 0.405 metric tons per megawatt year. Solid wastes impacts are 0.108 metric tons per year of operation. Other impacts such as those caused by heavy lift launch vehicle sites are also discussed. S.B.S.

N79-12558*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SATELLITE POWER SYSTEM (SPS) MICROWAVE SUBSYSTEM IMPACTS AND BENEFITS
Richard M. Dickinson 28 Sep. 1977 104 p refs Sponsored by NASA
(NASA-CR-157951; JPL-900-800) Avail: NTIS HC A06/MF A01 CSCL 10A

The impacts and benefits to society of the microwave subsystem resulting from the developing, construction and operating of a space solar power to earth, electric power delivery system are presented and discussed. The primary benefit (usable energy) is conveyed mainly in the fundamental frequency portion of the RF radiation beam that is intercepted and converted to electric power output. The small fraction of the microwave and other electromagnetic energy that does not end up in the electric utility grid, yields most of the subsystem impacts. The impacts range from harmonics and noise radiated by the transmitting antenna, through potential interference with ionospheric communications and navigation caused by the power beam heating the ionosphere, to the potential large land area requirements for the rectennas and low level microwave radiation around the rectennas. Additional benefits range from a very low level of waste heat liberated and lack of atmospheric emissions including noise while operating to having no residual ionizing radiation from the rectenna when it is deactivated. S.B.S.

N79-12559# Dayton Univ. Research Inst., Ohio.
A FEASIBILITY STUDY OF INORGANIC OXIDE-FLUORIDE COMPOSITIONS FOR THERMAL ENERGY STORAGE APPLICATIONS Final Report
J. E. Davison Apr. 1978 56 p refs
(Grant AF-AFOSR-3117-77; AF Proj. 2301)
(AD-A059001; UDRI-TR-78-41; AFOSR-78-1145TR) Avail: NTIS HC A04/MF A01 CSCL 10/3

The purpose of this present investigation was to review the liquid-solid transformations of chemical compositions intermediate between pure inorganic fluorides and pure inorganic oxides. The liquid-solid transformations of seventy oxide-fluoride systems were reviewed. Five of these oxide-fluoride systems were identified which have liquid-solid transformations in the desired temperature interval. The values of the enthalpy of the liquid-solid transformation, the eutectic temperature, the thermal diffusivity, and the density of the liquid and solid phases were measured. These measured values were compared to the values which had been measured on inorganic eutectic fluorides. As a result of this comparison, the LiF-MgF2-KF eutectic composition is recommended for thermal energy storage application because of the larger value for the enthalpy of transformation.Author (GRA)

N79-12560# Tetra Tech, Inc., Arlington, Va.
US NAVY ENERGY PLAN AND PROGRAM, 1978
Jun. 1978 209 p
(Contract N00014-78-C-0097)
(AD-A058054; TETRAT-A-6053-02-78-368; OPAV-41-P4)

Avail: NTIS HC A10/MF A01 CSCL 05/1

The 1978 U.S. Navy Energy Plan and Program is intended to keep the CNO appraised of the Navy energy situation and to update Navy energy program goals in light of presidential executive orders and DOD directives. The plan and program includes a brief overview of the world, national and Navy energy situations; Navy energy objectives and goals; a summary of program accomplishments; a description of the approved FYDP (POM-79) Navy energy program; and a description of an expanded energy program required to meet federally mandated goals.

Author (GRA)

N79-12561# Air Force Academy, Colo. Frank J. Seiler Research Lab.

NEW LOW TEMPERATURE, HIGH ENERGY DENSITY BATTERY SYSTEMS

John K. Erbacher, Charles L. Hussey, and John C. Nardi Jul. 1978 10 p refs Presented at the AFSC S and E Symp., Wright-Patterson AFB, Ohio, 28-29 Oct. 1977

(AF Proj. 2303)

(AD-A058121; FJSRL-TR-78-0007) Avail: NTIS HC A02/MF A01 CSCL 10/3

The thermal battery work unit of the Frank J. Seiler Research Laboratory (AFSC), USAF Academy, CO, has conceived, designed, and constructed laboratory prototype thermal battery single cells which utilize the inherent high energy of reaction of aluminum and aluminum alloys with transition metal chlorides. The individual cells are comprised of an aluminum or lithium-aluminum alloy anode and an immobilized liquid sodium tetrachloroaluminate electrolyte. The electrolyte is completely immobilized by the addition of finely divided silica. The cell cathode is either molybdenum pentachloride or cupric chloride in intimate contact with a graphite current collector. Trilayer pellets were constructed incorporating the anode, electrolyte and cathode. The discharge behavior was studied from 175-275 C at current densities from 2-120 milliamps per square centimeter to evaluate the operational temperature ranges and current density characteristics of the two systems. Author (GRA)

N79-12562# Unified Industries, Inc., Alexandria, Va.

ARMY ENERGY PLAN

Richard J. Boas 22 Feb. 1978 176 p refs

(Contract DAAG39-77-C-0164)

(AD-A057987; UII-70101) Avail: NTIS HC A09/MF A01 CSCL 05/1

The Plan identifies the Army's organization, goals, objectives, and policies with respect to energy. It projects energy consumption and costs to the year 2000 and summarizes the programs required to support the long range goals. A summary of current and needed energy related legislation is included. Author (GRA)

N79-12563# Army Command and General Staff Coll., Fort Leavenworth, Kansas.

THE DEPARTMENT OF DEFENSE'S ALTERNATE ENERGY POLICY M.S. Thesis Final Report

William J. Lucas 9 Jun. 1978 81 p refs

(AD-A058200) Avail: NTIS HC A05/MF A01 CSCL 21/4

This thesis examines the question of the scarcity of petroleum-based fuels early in the Twenty-First Century and the DOD policy and programs to meet this shortage. Based on the fact that petroleum fuels as we know them will not be available early in the Twenty-First Century, this study examines the uniqueness of the DOD's world-wide mission and its dependence on petroleum fuels for its main weapon systems. Because of this uniqueness, it was concluded that the DOD needs an alternative fuels policy independent of other governmental agencies to meet the national security requirements. The current DOD policy on alternative fuels for the future is examined. This investigation revealed that, as of January 1978, the DOD did not have a comprehensive policy for alternative fuels. Further, the direction of Research and Development efforts has suffered as a result of this lack of policy. Lastly, the study offers a proposed policy for consideration. Recommendations for both short- and long-range goals are proposed. Conclusions were that an alternative fuels policy is absolutely necessary and that a policy needs to be established as soon as possible. Author (GRA)

N79-12564# Argonne National Lab., Ill. Engineering Div.

EXPERIMENTAL TWO-PHASE LIQUID-METAL MAGNETOHYDRODYNAMIC GENERATOR PROGRAM Annual Report

M. Petrick, G. Fabris, E. S. Pierson, A. K. Fischer, and C. E. Johnson May 1978 104 p refs

(Contract N00014-77-F-0006; NR Proj. 099-404)

(AD-A059240; ANL-MHD-78-2) Avail: NTIS HC A06/MF A01 CSCL 10/2

Testing of the second diverging-channel generator with the revised ambient-temperature NaK-N2 facility has been completed. The primary goal of the revised facility, demonstrating reduced slip ratio (ratio of gas velocity to liquid velocity) with higher liquid velocity (flow rate), was accomplished. The reduction in slip ratio was dramatically demonstrated by a series of consecutive runs with varying flow rate (from 6 kg/s to 12 kg/s for the liquid). Substantial increases in generator efficiency were obtained with higher liquid flow rates. Experiments to demonstrate that good liquid-to-gas heat transfer exists in the generator were successfully completed. Good heat transfer is essential because it is the almost constant temperature expansion of the gas (vapor) in the generator that yields higher system efficiencies for liquid-metal MHD power cycles. The feasibility of generating relatively-stable bubbles, hence, a foam, in liquid metals has been demonstrated. Photographic documentation of these phenomena, both motion and still pictures, was made. Surface tension measurements and foaming experiments have shown that viscosity is also a factor in promoting bubble formation and persistence. Wetting and contact angle measurements have been made for stainless steel and carbon steel immersed in eutectic NaK. GRA

N79-12565# Sandia Labs., Albuquerque, N. Mex.

SOLAR TOTAL ENERGY TEST FACILITY PROJECT TEST RESULTS: HIGH-TEMPERATURE THERMOCLINE STORAGE SUBSYSTEM

T. D. Harrison, C. E. Hickox, A. Ortega, and K. Wally Apr. 1978 41 p refs

(Contract EY-76-C-04-0789)

(SAND-77-1528) Avail: NTIS HC A03/MF A01

The results of tests conducted on the Sandia Laboratories High-Temperature Thermocline Storage Subsystem (HTTSS) from August 1976 through June 1977 are summarized and analyzed. A thermocline storage system has certain theoretical thermodynamic and economic advantages that make it an attractive thermal energy storage concept. The studies described were performed to determine to what extent these theoretical advantages could be realized in practice. The objectives of the tests described were to measure thermal losses from the tank, to determine the stability of the thermocline, and to estimate the costs associated with the thermocline thermal energy storage option. Results of tests performed with the thermocline storage system associated with the New Mexico/DOE Solar Irrigation Project at Willard, New Mexico, are included for comparison. DOE

N79-12566# Department of Energy, Oak Ridge, Tenn. Technical Information Center.

ENERGY INFORMATION DATA BASE: SERIAL TITLES

Feb. 1978 568 p

(TID-4579-R10) Avail: NTIS HC A24/MF A01

This publication is the authority list for serial titles as used by the DOE Technical Information Center. Title abbreviations are, with few exceptions, in accordance with the International Organization for Standardization. Entries are arranged alphabetically letter-by-letter according to the abbreviated form of the title. The complete title entry is based on the International Serial Data System and generally appears in the form as given on the publication. DOE

N79-12567# Department of Energy, Washington, D. C. Div. of Solar Technology.

NATIONAL PHOTOVOLTAIC PROGRAM PLAN

Mar. 1978 34 p

(DOE/ET-0035(78)) Avail: NTIS HC A03/MF A01

The federal government's Photovoltaic Program is described. The program is designed to expand the commercial use of photovoltaic systems as rapidly as possible through a program

of research, process development in support of the manufacturing industry, test, and applications. DOE

N79-12568# Los Alamos Scientific Lab., N. Mex.
THERMAL STRESS CRACKING AND THE ENHANCEMENT OF HEAT EXTRACTION FROM FRACTURED GEOTHERMAL RESERVOIRS
Apr. 1978 19 p refs
(Contract W-7405-eng-36)
(LA-7235-MS) Avail: NTIS HC A02/MF A01

The extraction of heat from geothermal reservoirs formed by the hydraulic fracturing of competent rock will eventually result in the formation of thermal stress cracks in the reservoir. These cracks penetrate the rock in a manner such that the penetration-to-spacing ratio is approximately one. The penetration depends upon the extent of cooling and the square root of time. Initially then, the cracks are closely spaced and penetrate but little, so that a crazing pattern is apparent; but with increasing time some of these cracks, now more widely spaced, grow deeper. Eventually these larger cracks attain a critical aperture such that significant rates of water flow can be established within them and thus the newly created heat transfer area becomes useful for heat extraction. At the same time that cracks are forming within the main reservoir, thermal cracking also occurs in the wellbores that communicate with the reservoir. These cracks eventually convey water to and from the reservoir, thus leading to a decrease in the flow impedances that are often concentrated in the wellbore regions. DOE

N79-12569# Department of Energy, Washington, D. C.
ENVIRONMENTAL DEVELOPMENT PLAN (EDP): PHOTOVOLTAICS, 1977
Mar. 1978 53 p refs
(DOE/EDP-0003) Avail: NTIS HC A04/MF A01

The status, program goals, and potential applications of photovoltaic technologies are reviewed. Potential areas of environmental concern relevant to both system production and use are identified. Among these concerns are occupational exposure to hazardous substances, environmental effects and possible subsequent public health problems, and socioeconomic impacts. Screening of identified possible impacts resulted in delineation of those of the most serious, irreversible and cumulative nature, which have near-term importance to the program and for which current knowledge of effects and control technologies are inadequate. A management plan coordinating studies in necessary environmental research areas with the technology development schedule is presented. The principal concerns involve worker exposure to hazardous substances during preparation of semiconductor materials and photovoltaic cells. DOE

N79-12570# Sandia Labs., Albuquerque, N. Mex.
COMBINED PHOTOVOLTAIC THERMAL COLLECTOR TESTING
D. R. Smith, K. L. Biringer, and D. A. Pritchard 1978 6 p refs Presented at IEEE Photovoltaic Specialists Conf., Wash., D.C., 5 Jun. 1978
(Contract EY-76-C-04-0789)
(SAND-78-1191C; Conf-780619-8) Avail: NTIS HC A02/MF A01

A commercially available liquid-cooled thermal flat-plate collector was modified by the addition of 104 silicon cells in four parallel strings extending almost the entire length of the collector front surface. The electrical efficiency of the cell array was measured as a function of temperature for three different flow rates corresponding to temperature differences between inlet and outlet coolant ranging from 4 C to 38 C. The data showed a linear decrease in electrical efficiency with the temperature of the panel surface measured halfway between inlet and outlet ports. The efficiency-temperature relationship was independent of the temperature gradient. The thermal efficiency also exhibited a linear decrease with increasing difference between inlet coolant temperature and ambient temperature. The measured array efficiency (8.1 percent at 27 C) was comparable to the measured efficiency of a single cell from the same lot. DOE

N79-12571# National Bureau of Standards, Washington, D. C. Center for Building Technology.
PROVISIONAL FLAT PLATE SOLAR COLLECTOR TESTING PROCEDURES Interim Report
David Waksman, Elmer R. Streed, Thomas Reichard, and Louis E. Cattaneo Jun. 1978 66 p refs Revised; supersedes NBSIR-78-1305
(Contract DOE-EA-77-01-6010)
(PB-283721/9; NBSIR-78-1305A-Rev-1) Avail: NTIS HC A04/MF A01 CSCL 13A

The test methods contained in this report and the provisional rating criteria presented in an appendix are intended for use in determining the thermal performance, and to aid in the assessment of the safety and durability/reliability of flat plate solar collectors. GRA

N79-12572# Rutgers - The State Univ., Piscataway, N. J.
SILICON SCHOTTKY PHOTOVOLTAIC DIODES FOR SOLAR ENERGY CONVERSION Final Report, 1 Jun. 1975 - 31 May 1978
Wayne A. Anderson Jul. 1978 72 p refs Prepared in cooperation with DOE
(Grant NSF AER-73-03197)
(PB-283998/3; NSF/RANN/SE/AER73-03197/FR/78) Avail: NTIS HC A04/MF A01 CSCL 10B

A 12.2% Cr-MIS solar cell was fabricated on (100) p-type, single-crystal Si. An efficiency of 8.8% was recorded on Wacker polycrystalline Si. Surface-state density values range from 1.5 x 10 to the 11th power/sw cm-eV to 1.5 x 10 to the 13th power/sq cm-eV for MIS diodes on (100) singlecrystal, Wacker polycrystalline, IBM ribbon, and EFG ribbon Si. These data correspond to Vsub oc = 0.25-0.60 V on similar photovoltaic cells. Columnar, 5-micrometer crystillites obtained on e-beam-deposited Si films having a 20-30 micrometer thickness. Rectification and photovoltiac response observed. GRA

N79-12573# Energy, Inc., Idaho Falls, Idaho.
ENERGY SUPPLY AND ENVIRONMENTAL IMPACTS: CONVENTIONAL SOURCES, STUDY MODULE 3-A, TECHNICAL APPENDIX Final Code Users Manual
James H. McFadden 1978 122 p refs Sponsored by Pacific Northwest Regional Comm., Vancouver, Wash.
(PB-283787/0; NEPP-3-A-APP) Avail: NTIS HC A06/MF A01 CSCL 10A

The future supplies and prices of all forms of energy consumed in the Pacific Northwest (electricity, natural gas, petroleum, and coal) through the year 2000 are examined. Sets of alternative assumptions on the availability, price, and use of these forms of energy are used to develop scenarios leading to low, moderate, and high rates of growth in supply and demand. Quantified estimates of the environmental impacts likely to occur at each rate of growth are given. This technical appendix contains the code users manual, the environmental impact coefficients, and sample problems in natural gas, petroleum, coal, and electricity. GRA

N79-12574# Kentucky Univ., Lexington. Inst. for Mining and Minerals Research.
A KENTUCKY ENERGY RESOURCE UTILIZATION PROGRAM Semiannual Report, 1 Jul. - 31 Dec. 1977
Jun. 1978 66 p refs
(PB-283796/1; IMMR37-PR6-78) Avail: NTIS HC A04/MF A01 CSCL 08I

Research and education projects being conducted by the IMMR, several University of Kentucky departments, the University of Louisville, and eight other Kentucky educational institutions are reported. These projects are assigned to one of three technical divisions: materials, process development, or resources, recovery and reclamation. A summary of progress for each division is included. These projects include analytical methods development, research in catalysis, coal preparation, reclamation, and improved mining techniques. GRA

N79-12575# Illinois Univ. at Urbana-Champaign, Urbana. Inst. of Government and Public Affairs.
ENERGY AND ENVIRONMENT: AN INTERGOVERNMENTAL PERSPECTIVE Final Report
Boyd R. Keenan Jan. 1978 155 p refs Papers presented at Ohio River Valley Assembly, College Corner, Ohio, 10-12 Oct. 1977
(Contract EE-77-C-02-4310; Grant EPA-R-805615-01)

(PB-283733/4) Avail: NTIS HC A08/MF A01 CSCL 10A

The background papers written for the Ohio River Valley meeting and the text of oral presentations, each focusing on different aspects of the intergovernmental character of regional energy and environmental problems are presented. Topics discussed include: the Ohio River Valley at the center of the American energy dilemma; intergovernmental energy and environmental challenges in the Ohio River Valley-the view from Washington; intergovernmental energy and environmental challenges in the Ohio River Valley-the view from the states; regionalism in the Ohio River Valley-the river basin planning perspective; challenges of intergovernmental cooperation in waterway management in the Ohio River Valley; intergovernmental cooperation in waterway management in the Ohio River Valley; intergovernmental cooperation in 'up-valley' pollution transport management and a region's energy and environmental future-organizational options. GRA

N79-12576# RPC International, Inc., Austin, Tex.
MANAGING OIL AND GAS ACTIVITIES IN COASTAL ENVIRONMENTS
William L. Longley, Rodney Jackson, and Bruce Snyder Jun. 1978 75 p
(Contract DI-14-16-0008-2152)
(PB-283677/3; FWS/OBS-78/54) Avail: NTIS HC A04/MF A01 CSCL 10A

Coastal ecosystems are grouped into uplands, seasonally flooded wetlands, saturated wetlands, and open water, characteristic vegetation, animals, water regimes and management practices are described. The impacts of petroleum development activities, ranging from pre-exploration surveys through termination of production are viewed in various ecosystems; comments and suggestions are included to help mitigate the effects. GRA

N79-12577# Martin Marietta Labs., Baltimore, Md.
BIOLOGICAL SOLAR ENERGY CONVERSION APPROACHES TO OVERCOME YIELD STABILITY AND PRODUCT LIMITATIONS Progress Report, 1 Oct. 1977 - 31 Mar. 1978
Bessel Kok, C. F. Fowler, R. J. Radmer, and B. V. Velthuys 1978 37 p refs
(Grant NSF AER-73-03291)
(PB-284823/2; MML-TR-78-18; NSF/RA-780065; PR-6) Avail: NTIS HC A03/MF A01 CSCL 06A

A series of experiments was performed in which chlorophyll fluorescence was monitored in parallel with the mass spectrometer gas exchange measurements. It was observed that the fluorescence yield is not significantly altered when O2, rather than CO2, was the terminal electron acceptor, and it was concluded that the state of the photosynthetic apparatus is not strongly affected by a changeover from CO2 fixation to O2 reduction, or vice-versa. The study of photosynthetic activities in chloroplasts and particles of corn leaves was continued. The feasibility of measuring the relative contents of system 1 and system 2 photocenters in spinach and maize chloroplasts was examined. GRA

N79-12578# Northwest Energy Policy Project, Portland, Oreg.
ENERGY FUTURE NORTHWEST: NORTHWEST ENERGY POLICY PROJECT Final Report
May 1978 187 p
(PB-284697/0) Avail: NTIS HC A09/MF A01 CSCL 10A

Regional, state and local policy options which might influence future patterns of energy production and energy consumption in the Northwest states of Idaho, Oregon and Washington are highlighted. The Project also evaluated the social, environmental and economic consequences of exercising the various state and local energy policy choices. GRA

N79-12579# Maryland State Dept. of Legislative Reference, Annapolis. Scientific Div.
THE ENERGY DILEMMA: A CHALLENGE FOR MARYLAND. PROCEEDINGS MARYLAND GENERAL ASSEMBLY/AISLE CONFERENCE
Myron Miller, Diane Chapman Willis, and Eleanor D. Musk Jul. 1978 151 p Conf. held at Annapolis, 1-3 Dec. 1977 Sponsored in part by NSF
(PB-284703/6; NSF/RA-770583) Avail: NTIS HC A08/MF A01 CSCL 10A

Topic areas cover: energy resources management; National Energy Act - application to Maryland; energy conservation buildings and homes; water resources management - energy implications; energy and air quality management; and alternate energy resources. GRA

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N79-12580 California Univ., Los Angeles.
THE BIOLOGICAL COMPONENT OF ENVIRONMENTAL ASSESSMENT: CONCEPTS AND CASE STUDIES Ph.D. Thesis
Janet Fahey 1978 286 p
Avail: Univ. Microfilms Order No. 7820214

The biological component of environmental assessment is defined by the present activities of applied biologists, by the existing federal, State and local regulatory and legal framework within which they are executed. The deficiencies of these activities and regulations can be discovered in an examination of the ecological concepts which underlie them. Applied biological studies tend to focus on characterizing the physical environment, developing a species list and, occasionally, measuring physiological tolerances of selected organisms to environmental change. The reality of natural situations is far more complex than these studies can hope to reveal. A species' long term survival depends on numerous indirect and subtle factors. There occur inter-specific and other interactions at other levels of organization which are frequently the most important biological aspect of the problem, though their effects are indirect. Dissert. Abstr.

N79-12581 California Univ., Los Angeles.
TECHNICAL AND ENVIRONMENTAL ASPECTS OF OIL SHALE PROCESSING Ph.D. Thesis
Jay Douglass White 1978 296 p
Avail: Univ. Microfilms Order No. 7820299

Oil shale processing techniques currently being considered for application to United States oil shale deposits include: (1) aboveground or surface retorting, (2) modified in situ retorting, and (3) true in situ retorting techniques. The candidate oil shale technologies within each of these categories were identified and described. A representative retorting technology from each category was studied as an example of the current state-of-the-art. The analysis included a description of process operations, a technical evaluation of the process, and a scenario of a commercial scale operation using the retorting technology selected for analysis. The environmental aspects of commercial scale development activities, the ecological effects of large scale land disruption, potential health risks to oil shale industry workers, and socio-economic impacts to communities in the oil shale region are discussed. Dissert. Abstr.

N79-12582 North Carolina State Univ. at Raleigh.
TIME SERIES ANALYSIS OF MICROMETEOROLOGICAL MEASUREMENTS IN AIR POLLUTION MONITORING Ph.D. Thesis
Rudy Ho Tan 1978 205 p
Avail: Univ. Microfilms Order No. 7820053

A robust procedure for fitting a second-order autoregressive model to micrometeorological time series was developed. Ordinary least squares estimates of the parameters in the model were obtained after a preliminary screening phase which detected and removed outliers. The technique was applied to several sets of temperature, wind speed, azimuth and elevation angle measurements. The effects of different combinations of sampling intervals and sampling times on the fitted second-order autoregressive model, the estimated spectrum function, and estimated mean and standard deviations of wind speed, azimuth, and elevation angle measurements were examined. The model provided a compact, yet adequate description of the data, even for very large sampling interval and short sampling time. Examination of the spectra for the series sampled at five seconds

and lower sampling rates revealed effects attributed to aliasing.
Dissert. Abstr.

N79-12583 Washington Univ., Seattle.
NEW ELECTROCHEMICAL METHODS FOR QUANTITATION AND SPECIATION OF TRACE METALS, AND PATTERN RECOGNITION ASSESSMENT OF WATER QUALITY DATA Ph.D. Thesis
Steven David Brown 1978 314 p
Avail: Univ. Microfilms Order No. 7824440

Results are presented for a study, using chemometric methods, of a data set taken on a creek in Colorado, impacted by a strip mine. Suggestions are made for improvements in data collection to allow more efficient analysis using chemometric techniques. The development and characterization of a minicomputer-controlled anodic stripping voltammeter is discussed which uses digital background subtraction for efficient compensation of the capacitive current. Sensitivities in the pg/ml range were obtained for lead, copper, and cadmium. The application of sensitive electrochemical techniques to questions of trace metal speciation is discussed, and a new technique, using the computer-controlled voltammeter to perform analysis, is presented. The speciation of arsenic is studied in dilute acidic solutions, and the probable speciation of lead in a geothermal water sample is discussed.
Dissert. Abstr.

N79-12584* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SIMULTANEOUS TREATMENT OF SO2 CONTAINING STACK GASES AND WASTE WATER Patent
Jerry C. Poradek and Dwight D. Collins, inventors (to NASA) (Chemsoil Corp., Bakersfield, Calif.) Issued 31 Oct. 1978 6 p Filed 21 Nov. 1977 Supersedes N78-15954 (16 - 06, p 0829)
(NASA-Case-MSC-16258-1; US-Patent-4,123,355; US-Patent-Appl-SN-853705; US-Patent-Class-210-50; US-Patent-Class-55-73; US-Patent-Class-210-60; US-Patent-Class-210-63R; US-Patent-Class-423-242) Avail: US Patent and Trademark Office CSCL 13B

A process for simultaneously removing sulfur dioxide from stack gases and the like and purifying waste water such as derived from domestic sewage is described. A portion of the gas stream and a portion of the waste water, the latter containing dissolved iron and having an acidic pH, are contacted in a closed loop gas-liquid scrubbing zone to effect absorption of the sulfur dioxide into the waste water. A second portion of the gas stream and a second portion of the waste water are controlled in an open loop gas-liquid scrubbing zone. The second portion of the waste water contains a lesser amount of iron than the first portion of the waste water. Contacting in the openloop scrubbing zone is sufficient to acidify the waste water which is then treated to remove solids originally present.
Official Gazette of the U.S. Patent and Trademark Office

N79-12585*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AIR POLLUTION FROM AIRCRAFT OPERATIONS AT SAN JOSE MUNICIPAL AIRPORT, CALIFORNIA
Edward T. Schairer Nov. 1978 23 p refs
(NASA-TM-78506; A-7523) Avail: NTIS HC A03/MF A01 CSCL 13B

The amount of air pollution discharged by arriving and departing aircraft at the San Jose Municipal Airport was estimated. These estimates were made for each one hour interval of a summer weekday in 1977. The contributions of both general aviation (personal and business aircraft) and certified air carriers (scheduled airliners) were considered. The locations at which the pollutants were discharged were estimated by approximating the flight paths of arriving and departing aircraft. Three types of pollutants were considered: carbon monoxide, hydrocarbons, and oxides of nitrogen. S.B.S.

N79-12586*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
APPLICATION OF ION CHROMATOGRAPHY TO THE STUDY OF HYDROLYSIS OF SOME HALOGENATED HYDROCARBONS AT AMBIENT TEMPERATURES
Dumas A. Otterson 1978 24 p refs Presented at Symp. on Ion Chromatography, Sunnyvale, Calif., 21 Jun. 1978 Sponsored by the Dionex Corp.
(NASA-TM-79020; E-9817) Avail: NTIS HC A02/MF A01 CSCL 07D

The application of ion chromatography to the study of very slow rates of hydrolysis of some halogenated hydrocarbons was investigated. The halide concentrations in the aqueous phase of mixtures of a carbonate buffer (pH = 10.3) and either chloroform (CHC13) or fluorotrichloromethane (CFC13) after aging for various lengths of time at room temperature, were determined by ion chromatography. Hydrolysis of CHC13 caused the C1(-) concentration to increase by about 1500 ppb per day. On the other hand neither the F(-) or C1(-) concentration in the CFC13 mixture increased by as much as 1 ppb per day. The magnitude of errors in the determination of halides prevented any firm conclusions regarding hydrolysis in this mixture. However, these results were used to show how ion chromatography could expedite identification of the hydrolyzing substance as well as investigations of hydrolysis mechanisms. Author

N79-12587*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFLUENT MONITORING OF THE DECEMBER 10, 1974, TITAN 3-E LAUNCH AT AIR FORCE EASTERN TEST RANGE, FLORIDA
Dewey E. Wornom and David C. Woods Nov. 1978 52 p refs
(NASA-TM-78735; L-12279) Avail: NTIS HC A04/MF A01 CSCL 13B

Surface and airborne field measurements of the cloud behavior and effluent dispersion from a solid rocket motor launch vehicle are presented. The measurements were obtained as part of a continuing launch vehicle effluent monitoring program to obtain experimental field measurements in order to evaluate a model used to predict launch vehicle environmental impact. Results show that the model tends to overpredict effluent levels. Author

N79-12588# SRI International Corp., Menlo Park, Calif.
COMPUTER MODELING OF SIMULATED PHOTOCHEMICAL SMOG
D. G. Hendry, A. C. Baldwin, J. R. Barker, D. M. Golden, and Marcia C. Dodge Jun. 1978 304 p refs
(Contract EPA-68-02-2427)
(PB-284025/4; EPA-600/3-78-059) Avail: NTIS HC A14/MF A01 CSCL 04A

The photochemical smog chemistries of ethene, propene, butene-1, trans-butene-2, n-butane, 2,3-dimethylbutane, and toluene NOx systems were developed and tested with smog chamber data collected at the University of California, Riverside. The mechanisms are composed of critically evaluated kinetic data for the individual reactions to the extent possible. Where data on specific reactions were not available or were not at the appropriate temperature and pressures, thermochemical techniques were used to estimate or extrapolate existing data to obtain the desired rate data. Whenever thermochemical data were estimated to predict rate constants, error bounds were assigned to the estimates and the resulting rate constants. In only a relatively few cases was it necessary to vary the estimated rate constants within the error limits in order to optimize the agreement between computed and experimental concentration-time profiles. GRA

N79-12589# Michigan State Univ., East Lansing. Inst. of Water Research.
THE DYNAMICS OF ACCUMULATION OF PHOSPHORUS BY THE SEDIMENTS OF THE LAKE SYSTEM OF THE WATER QUALITY MANAGEMENT PROJECT AT MICHIGAN STATE UNIVERSITY
Thomas C. Young and Robert C. Ball Feb. 1978 104 p refs
(PB-283763/1; MSU-IWR-TR-78-0045; FTR-45) Avail: NTIS HC A06/MF A01 CSCL 13B

The lake system of the Michigan State University Water Quality Management Project received secondary effluent from the wastewater treatment plant in East Lansing. Phosphorus dynamics in the sediments of lakes were investigated in terms of transport of phosphorus to the sediments by sedimentation of seston, accumulation of phosphorus in the sediments, and partitioning of phosphorus in seston and sediments. The

resuspension affected the pattern of phosphorus accumulation in sediments. GRA

N79-12590# KVB Engineering, Inc., Tustin, Calif.
CONTROL OF HYDROCARBON EMISSIONS FROM STATIONARY SOURCES IN THE CALIFORNIA SOUTH COAST AIR BASIN, VOLUME 1 Final Report
H. J. Taback, T. W. Sonnichsen, N. Brunetz, and J. L. Stredler Jun. 1978 460 p refs Sponsored by the California Air Resources Board, Sacramento
(PB-283486/9; KVB-5804-714-Vol-1; ARB-R-5-1323-78-80) Avail: NTIS HC A20/MF A01 CSCL 13B

One hundred forty speciated emission profiles were developed to describe hydrocarbon emissions for various source categories. Total hydrocarbon emissions of 2200 tons per day (tpd) of which one-half is methane were determined. Point sources account for 350 tpd and area sources account for 1850 tpd total hydrocarbon emissions. The petroleum industry accounts for about 20 percent of the total emissions; 110 tpd from production, 120 tpd from refining, and 190 tpd from marketing. Solvent use accounts for another 10 percent of the organic emissions. Control techniques in 60 industrial and commercial processes are discussed with emphasis on efficiency and cost effectiveness. GRA

N79-12591# National Technical Information Service, Springfield, Va.
NITROGEN OXIDE AIR POLLUTION. VOLUME 2, PART 1: CONTROL TECHNOLOGY. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1975 - Aug. 1978
Diane M. Cavagnaro Sep. 1978 305 p Supersedes NTIS/PS-77/0850
(NTIS/PS-78/0971/8; NTIS/PS-77/0850) Avail: NTIS HC $28.00/MF $28.00 CSCL 13B

Nitrogen oxide air pollution control is covered from both mobile and stationary sources. Fluidized bed combustion, boiler combustion modification, and engine design are discussed, as they relate to emissions reduction. This updated bibliography contains 299 abstracts, 106 of which are new entries to the previous edition. GRA

N79-12592# National Technical Information Service, Springfield, Va.
NITROGEN OXIDE AIR POLLUTION. VOLUME 2, PART 2: DETECTION AND ANALYSIS. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1976 - Aug. 1978
Diane M. Cavagnaro Sep. 1978 169 p Supersedes NTIS/PS-77/0852
(NTIS/PS-78/0972/6; NTIS/PS-77/0852) Avail: NTIS HC $28.00/MF $28.00 CSCL 06T

Techniques and equipment used in the gas analysis of ambient atmospheres, exhaust emissions, and flue gases are cited in the bibliography. This updated bibliography contains 163 abstracts, 54 of which are new entries to the previous edition. GRA

N79-12593# National Technical Information Service, Springfield, Va.
NITROGEN OXIDE AIR POLLUTION. PART 3: ATMOSPHERIC CHEMISTRY. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Aug. 1978
Diane M. Cavagnaro Sep. 1978 230 p Supersedes NTIS/PS-77/0853
(NTIS/PS-78/0973/4; NTIS/PS-77/0853) Avail: NTIS HC $28.00/MF $28.00 CSCL 04A

Photochemical air pollution models, smog chemistry and reactivity, and SST exhaust effects are covered in the bibliography. Auroral and upper atmospheric chemistry and photochemistry of naturally occurring nitrogen oxides are excluded. This updated bibliography contains 224 abstracts, 52 of which are new entries to the previous edition. GRA

N79-12594# National Technical Information Service, Springfield, Va.
NITROGEN OXIDE AIR POLLUTION. PART 4: BIOLOGICAL EFFECTS. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Aug. 1978
Diane M. Cavagnaro Sep. 1978 173 p Supersedes NTIS/PS-77/0851
(NTIS/PS-78/0974/2; NTIS/PS-77/0854) Avail: NTIS HC $28.00/MF $28.00 CSCL 07D

The effects of nitrogen oxide air pollution on humans, plants, and animals are covered in the bibliography. Toxicology, epidemiology, pathology, and the synergistic effects of nitrogen oxides and other pollutants are covered. This updated bibliography contains 157 abstracts, 25 of which are new entries to the previous edition. GRA

N79-12595# National Technical Information Service, Springfield, Va.
NITROGEN OXIDE AIR POLLUTION. VOLUME 2, PART 5: EMISSIONS STUDIES. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1975 - Aug. 1978
Diane M. Cavagnaro Sep. 1978 235 p Supersedes NTIS/PS-77/0855
(NTIS/PS-78/0975/9; NTIS/PS-77/0855) Avail: NTIS HC $28.00/MF $28.00 CSCL 07A

The bibliography cites studies on emissions from both stationary and mobile sources, emissions factors, regional emission inventories, and general studies. Air quality data are excluded. Nitrogen oxide detection and analysis, industrial control techniques, atmospheric chemistry, and biological effects are covered in parts 1 through 4. This updated bibliography contains 229 abstracts, 51 of which are new entries to the previous edition. GRA

N79-12596# Research Triangle Inst., Research Triangle Park, N. C.
PROJECT DAVINCI 2: DATA ANALYSIS AND INTERPRETATION Final Report
C. E. Decker, J. E. Sickles, II, W. D. Bach, F. M. Vukovich, and J. J. B. Worth Jun. 1978 244 p refs
(Contract EPA-68-02-2568)
(PB-284100/5; EPA-450/3-78-028) Avail: NTIS HC A11/MF A01 CSCL 04A

Air quality data observed abroad a manned balloon is reported and analyzed together with concurrent data from the St. Louis RAMS monitoring network, and from a mobile van which was driven beneath the track of the balloon. During daylight hours, ozone levels measured aboard the balloon and at a ground level were similar. At night, ozone trapped aloft by a nocturnal inversion remains stable, whereas azone observed at ground level decays rapidly. Transport of ozone overnight, for distances of at least 180 km, is documented. With the weak synoptic flow conditions prevailing on June 8, 1976, a daytime heat island effect is documented. Maximum ozone concentrations were observed at a location where this complex flow field converges. GRA

N79-12597# IIT Research Inst., Chicago, Ill.
STUDY OF REMOVAL PROCESSES FOR HALOGENATED AIR POLLUTANTS Final Report, Jul. 1975 - Dec. 1977
A. Snelson, R. Butler, and F. Jarke Jun. 1978 118 p refs
(Grant EPA-R-803805-02-2)
(PB-284066/8; EPA-600/3-78-058) Avail: NTIS HC A06/MF A01 CSCL 04A

Halocarbons released into the atmosphere from anthropogenic sources and their potential impact on the stratospheric ozone layer were studied. Experimental kinetic data were obtained for the reaction of OH radicals with CH3Cl, CH2Cl2, CHCl3, C2H5Cl, C2HACl2, CH3CCl3, C2Cl4, C2H4Br2, and CO. Best values for the OH + halocarbon rate constants were assessed and tropospheric lifetime calculated. The kinetics of the homogeneous gas phase hydrolysis of the secondary anthropogenic halocarbon pollutants, CCl3COCl, CCl2HCOCl, CClH2COCl, and COCl2 were studied. The rate studies show that removal by gas phase hydrolysis would have halflives in excess of 100 years. Some preliminary heterogeneous rain-out studies were made on CCl3COCl which suggest that rain-out would probably be an effective sink for its removal. GRA

N79-12598# Environmental Sciences Research Lab., Research Triangle Park, N.C.
METEOROLOGICAL CONDITIONS DURING A SULFATE EPISODE IN SOUTHERN CALIFORNIA Progress Report, Apr. 1977 - Jan. 1978
Gerrard A. Demarrais May 1978 44 p refs
(PB-284056/9; EPA-600/4-78-002) Avail: NTIS HC A03/MF A01 CSCL 04A

A prolonged period in which an air mass contained high concentrations of sulfate pollutants. The episode occurred during the off-season and virtually coincided with an oxidant episode. The meteorological conditions associated with both episodes were slow moving air; abundant sunshine; elevated temperatures; limited vertical mixing at the coast and inland vertical mixing varying from negligible at night to relatively deep in the daytime; relatively very poor visibilities due to smoke, haze, and fog; and high relative humidities at all times at the coast and at night at inland locations, but very low relative humidities in the daytime over inland locations. Differences in the spatial patterns in sulfate and oxidant concentrations were attributed to differences in the relative humidities at coastal and inland locations. GRA

N79-12599# National Oceanic and Atmospheric Administration, Boulder, Colo. Space Environment Lab.
PHOTODISSOCIATION RATES FOR MINOR SPECIES IN THE EARTH'S ATMOSPHERE
R. D. Harris (Utah State Univ.), R. A. McCue (Utah State Univ.), and G. W. Adams Sep. 1977 26 p refs
(PB-285162/4; NOAA-TR-ERL-391; SEL-39; NOAA-78071305) Avail: NTIS HC A03/MF A01 CSCL 04A

Photodissociation rates per molecule for ten minor atmospheric species were computed as functions of wavelength, altitude, and solar zenith angle for medium solar activity. Calculations for wavelengths from the onset of dissociation to 1000 A and for altitudes below 110 km for CO, CO2, CH4, C2H4, NO, NO2, N2O, H2O, H2O2, HNO3, and the major species O3 and O2 are reported. Photodissociation calculations depend upon the atmospheric O2 and O3 absorption but are independent of specific minor species densities. GRA

N79-12600# Environmental Sciences Research Lab., Research Triangle Park, N.C.
DICHOTOMOUS SAMPLER: A PRACTICAL APPROACH TO AEROSOL FRACTIONATION AND COLLECTION Report, Jan. 1975 - Jan. 1978
Robert K. Stevens and Thomas G. Dzubay Jun. 1978 31 p refs
(PB-284091/6) Avail: NTIS HC A03/MF A01 CSCL 14B

Procedures to size fractionate, collect, and analyze ambient concentrations of particulate matter are described. Emphasis is placed on the design and characteristics of the single-stage dichotomous sampler. An inlet is described that samples aerosol independent of wind speed and direction, and a discussion of the advantages of a pneumatic flow control system is included. Comparative results of the high-volume and dichotomous sampler are presented. GRA

N79-12601# Southern Research Inst., Birmingham, Ala.
EVALUATIONS OF NOVEL PARTICULATE CONTROL DEVICES Final Report, Jun. 1974 - Jan. 1978
Joseph D. McCain Jun. 1978 179 p refs
(Contract EPA-68-02-1480)
(PB-283973/6; EPA-600/7-78-093; SORI-EAS-78-347-3344F) Avail: NTIS HC A09/MF A01 CSCL 13B

Fractional and overall mass efficiency tests of four particulate control devices are described. Three were wet scrubbers: an Aronetics two-phase jet scrubber, an Entoleter centrifield scrubber, and a CEA variable-throat venturi scrubber. The fourth was a rexnord gravel-bed filter. The devices were used for controlling emissions from a submerged-arc ferroalloy furnace, an asphalt batching plant, a pulverized-coal-fired utility boiler and a portland cement clinker cooler, respectively. Total flue gas particulate mass concentrations and emission rates were determined at device inlets and outlets by conventional techniques. Inlet and outlet emission rates as functions of particle size were determined on a mass basis using cascade impactors for sizes from about 0.5 to 5 micrometers, and on a number basis for sizes smaller than 1 micrometer using optical and diffusional and/or electrical mobility methods. Brief descriptions are included of the control devices and the process on which each was utilized, the measurement methods, inlet and outlet size distributions, and overall and fractional efficiencies. GRA

N79-12602# Rockwell International Corp., Creve Couer, Mo. Air Monitoring Center.
REGIONAL AIR POLLUTION STUDY: HEAT EMISSION INVENTORY Final Report
F. E. Littman, R. W. Griscom, and E. Puronen Jun. 1978 67 p refs
(Contract EPA-68-02-2093)
(PB-284081/7; EPA-600/4-78-029) Avail: NTIS HC A04/MF A01 CSCL 13B

Heat emissions to the atmosphere originating directly or indirectly from the combustion of fossil fuels in the St. Louis, Missouri area were studied. With the exception of a small amount of energy radiated into space as light and the energy carried out of the area by cooling water (primarily the Mississippi River), all of the energy released by the combustion of fuels is sooner or later released to the atmosphere as heat, either at the point of production (the power stations) or where it is consumed. Heat emissions from point sources as well as area sources were considered. Heat emissions from point sources account for about 11 percent in the area. Point source emissions are, however, in the form of concentrated plumes, while other heat emissions are diffused. Thus, the meteorological dispersion behavior of these sources is quite different. GRA

N79-12603# Rockwell International Corp., Creve Couer, Mo. Air Monitoring Center.
REGIONAL AIR POLLUTION STUDY: POINT AND AREA SOURCE ORGANIC EMISSION INVENTORY
R. W. Griscom Jan. 1978 58 p refs
(Contract EPA-68-02-2093)
(PB-284107/0; EPA-600/4-78-028) Avail: NTIS HC A04/MF A01 CSCL 13B

An inventory of organic emissions from stationary and mobile sources was assembled for the St. Louis Air Quality Control Region. The inventory covered a point and area sources for process, combustion and evaporative emissions. A breakdown into five categories was assigned to each source type. The categories are (1)paraffins, (2)olefins, (3) aromatics,(4) aldehydes, and (5) non-reactives. The breakdown was made part of the RAPS Emission Inventory System which is stored on the EPS's Univac computer at Research Triangle Park, N. C. GRA

N79-12604# Meteorology Research, Inc., Altadena, Calif.
EFFECTS OF INTERFACIAL PROPERTIES ON COLLECTION OF FINE PARTICLES BY WET SCRUBBERS Final Report, Jun. 1975 - Dec. 1977
G. J. Woffinden, G. R. Markowski, and D. S. Ensor Jun. 1978 75 p refs
(Contract EPA-68-02-2109)
(PB-284073/4; MRI-77-FR-1503; EPA-600/7-78-097) Avail: NTIS HC A04/MF A01 CSCL 13B

The results of an analysis of typical wet scrubber models to determine the effects of surface tension on particle removal efficiency are reported. Particle capture (removal) is a two-step process: collision of a particle with a spray droplet, and coalescence with the droplet. The coalescence process (after a particle collides with a scrubber droplet) was described by a filmthinning model that assumes that coalescence is controlled by the thinning rate of an air or vapor layer trapped between an impacting particle and droplet. GRA

N79-12605# Radian Corp., Austin, Tex.
ASSESSMENT OF TECHNOLOGY FOR CONTROL OF TOXIC EFFLUENTS FROM THE ELECTRIC UTILITY INDUSTRY Final Task Report, Apr. 1977
J. D. Colley Jun. 1978 164 p refs
(Contract EPA-68-02-2608)
(PB-283716/9; EPA-600/7-78-090) Avail: NTIS HC A08/MF A01 CSCL 07A

The applicability of control technologies for reducing priority pollutants in effluents from the steam-electric power generating industry is assessed. Control technologies were surveyed to identify those that have demonstrated some control effectiveness for priority pollutants. From the preliminary survey, the control technologies most applicable to the utility industry were identified. The selected control technologies were evaluated to determine their effectiveness in reducing priority pollutants in utility streams and their associated costs. GRA

N79-12606# PEDCO-Environmental Specialists, Inc., Cincinnati, Ohio.
FLUE GAS DESULFURIZATION SYSTEM CAPABILITIES FOR COAL-FIRED STREAM GENERATORS, VOLUME 1. EXECUTIVE SUMMARY Final Task Report, Apr. - Dec. 1977
T. Devitt, R. Gerstle, L. Gibbs, S. Hartman, and R. Klier Mar. 1978 44 p
(Contract EPA-68-02-2603)
(PB-284045/2; EPA-600/7-78-032A) Avail: NTIS
HC A03/MF A01 CSCL 07A

The availability of technology for reducing SO2 emissions from coal-fired steam generators using flue gas desulfurization (FGD) systems is discussed. Foreign and domestic lime, limestone, double alkali, magnesium slurry, and Wellman-Lord FGD systems are described, and the design parameters and operating experiences are discussed. Steps that have been taken to achieve high system operability are covered along with disposal of FGD system wastes. GRA

N79-12607# Radian Corp., Austin, Tex.
CONTROL TECHNIQUES FOR VOLATILE ORGANIC EMISSIONS FROM STATIONARY SOURCES
May 1978 579 p refs
(Contract EPA-68-02-2608)
(PB-284804/2; EPA-450/2-78-022) Avail: NTIS
HC A25/MF A01 CSCL 13B

Techniques for the control of hydrocarbons and other vapor phase organics which contribute to the formation of oxidants are described. A general reference for state and local air pollution control engineers is provided. It can be used to provide: basic information on sources of oxidant precursors and control of these sources, estimates of control costs, and estimates of emission reductions achievable through control application. The information included is restricted to stationary sources. GRA

N79-12608# Acurex Corp., Mountain View, Calif. Energy and Environmental Div.
EMISSION CHARACTERIZATION OF STATIONARY NOx SOURCES. VOLUME 1: RESULTS
K. G. Salvesen, K. J. Wolfe, E. Chue, and M. A. Herther Jun. 1978 220 p refs
(Contract EPA-68-02-2160)
(PB-284520/4; EPA-600/7-78-120A) Avail: NTIS
HC A10/MF A01 CSCL 13B

Gaseous, liquid, and solid effluents from stationary NOx sources, projected to the year 2000 were inventoried and ranked according to their potential for environmental hazard. Sources were classified according to their pollution formation characteristics. A compilation of emission factors and regional and national fuel consumption data for specific equipment/fuel types is presented. It gives results of an emission inventory for NOx, SOx, CO, HC, particulates, sulfates, POM, and liquid or solid effluents. It projects emissions to 1985 and to 2000 for five energy scenarios, depicting alternative uses of coal, nuclear power, and synthetic fuels. It ranks sources by nationwide emissions loading for 1974, 1985, and 2000. It describes a source analysis model used to estimate pollution hazard, considering ambient dispersion, population exposure, background concentrations, and health-based impact threshold limits. It applies the model to the emission inventory to produce source rankings based on both single-pollutant and total-multimedia impact factors. GRA

N79-12609# Stanford Research Inst., Menlo Park, Calif.
SYSTEMS FOR RAPID RANKING OF ENVIRONMENTAL POLLUTANTS: SELECTION OF SUBJECTS FOR SCIENTIFIC AND TECHNICAL ASSESSMENT REPORTS Final Report
Stephen L. Brown, Buford R. Holt, and Kirtland E. McCaleb Jun. 1978 281 p refs
(Contract EPA-68-01-2940)
(PB-284338/1; EPA-600/5-78-012) Avail: NTIS
HC A13/MF A01 CSCL 13B

The development and testing of a system for rapidly ranking environmental pollutants is described. One potential use for the system is in choosing the most important candidates for Scientific and Technical Assessment Reports. Of several possible approaches to ranking environmental agents, a system depending on expert opinion but assisted by an objective subsystem was selected for development. The system defines procedures for collecting, processing, and evaluating data on production and use; environmental transport, transformation, and rate; and human health and welfare and ecological effects. A test of the objective subsystem confirmed the utility of the system. Of ten candidate agents, the three highest ranked were cyanides, carbon disulfide, and beryllium. GRA

N79-12610# Battelle Columbus Labs., Ohio.
DEVELOPMENT OF AN ECONOMICS-BASED METHODOLOGY FOR PROJECTING FUTURE POLLUTION PROBLEMS Final Report
Gary S. Stacey and James E. Flinn Jun. 1978 198 p refs
(Contract EPA-68-01-1837)
(PB-284337/3; EPA-600/5-78-011) Avail: NTIS
HC A09/MF A01 CSCL 13B

A methodology for identifying potential future toxic substance pollution problems is described. The methodology initiates the identification of problems by focusing on the potential for their occurrence in the production, exchange, and consumption of goods and services. The steps in the approach are (1) to rank products according to the potential they have for being associated with future pollution problems; (2) to identify the chemical constituents of the product; and (3) to analyze the chemical constituents to determine which chemicals occur frequently and in large quantities. The potential that each of the chemicals has for resulting in toxic substance problems is also assessed. GRA

N79-12611# Little (Arthur D.), Inc., Cambridge, Mass.
CHARACTERIZATION OF SORBENT RESINS FOR USE IN ENVIRONMENTAL SAMPLING Final Task Report, Mar. 1977 - Jan. 1978
R. F. Gallant, J. W. King, P. L. Levins, and J. F. Piecewicz Mar. 1978 163 p refs
(Contract EPA-68-02-2150)
(PB-284347/2; EPA-600/7-78-054) Avail: NTIS
HC A08/MF A01 CSCL 07D

The use of chromatographic techniques to characterize resins which are used to trap vapors in environmental sampling schemes is described. Techniques (frontal and elution analysis) which have been applied to characterize sorbent cartridges packed with Tenax-GC and XAD-2 sorbents are included. Three diverse adsorbate groups, consisting of eight distinct chemical classes, were studied as potential pollutants. Elution analysis of these vapors yielded specific retention volumes which can be directly related to the breakthrough characteristics of the sorbent resins under a diversity on sampling conditions. Frontal analysis results confirm the elution data for sorbate uptake of resins. Specific retention volume data extrapolated to ambient conditions correlate well with adsorbate boiling point and molecular polarizability. GRA

N79-12612# Air Pollution Technology, Inc., San Diego, Calif.
PARTICULATE CONTROL HIGHLIGHTS: FLUX FORCE/CONDENSATION WET SCRUBBING Final Report, Oct. 1977 - Apr. 1978
S. Calvert and R. Parker Jun. 1978 24 p refs
(Contract EPA-68-02-2190)
(PB-284481/9; EPA-600/8-78-005C) Avail: NTIS
HC A02/MF A01 CSCL 07A

Highlights are given for EPA's flux force/condensation effects to enhance fine particle collection. The FF/C scrubbing offered significant cost advantages over conventional control equipment for a large number of industrial sources. Generally, it was attractive when high removal efficiencies were required for fine particles, when flue gas enthalpy was sufficiently high, or when spent steam was available. The EPA's fine particle scrubber program was instrumental in identifying, understanding, and quantifying flux force and condensation effects in wet scrubbers. The EPA also has taken a leading role in developing and demonstrating FF/C scrubbers for industrial applications. GRA

N79-12613# Geological Survey, Bay Saint Louis, Miss. Gulf Coast Hydroscience Center.
UNSTEADY SOLUTE-TRANSPORT SIMULATION IN STREAMFLOW USING A FINITE-DIFFERENCE MODEL Final Report
Larry F. Land May 1978 58 p refs

(PB-284264/9; USGS-WRD-WRI-78/049; USGS-WRI-78-18)
Avail: NTIS HC A04/MF A01 CSCL 13B

A computer program for simulating one-dimensional, unsteady solute transport in gradually varied streamflow was developed and documented. Before using the solute-transport model, a flow model must be used to calculate and store necessary flow data at each cross section and each time step. Such a flow model is available and documented. Given the flow and solute-inflow data, the digital model will calculate a time-series of concentration values for any point in the stream. The grid arrangement uses six model points and calculates the spatial and temporal derivatives at a slightly off-centered point. A tridiagonal matrix is created and solved at each time step by the Thomas algorithm. GRA

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation*.

N79-12614 Yale Univ., New Haven, Conn.
ON THE TIME-AVERAGE ASYMMETRIC CIRCULATION OF THE EARTH'S ATMOSPHERE Ph.D. Thesis
Steven Morris Ashe 1978 319 p
Avail: Univ. Microfilms Order No. 7819694

The dynamics and thermodynamics of the large-scale circulation in the troposphere were investigated with emphasis on the deviations from zonal symmetry which arise from the zonal state due to horizontally nonuniform diabatic heating, the convergences of the large-scale transient-eddy transports (the climatic effects of weather systems), and through the action of continental elevation variations. An implicit model is described from which the diabatic heating, transient-eddy statistics and mean asymmetric variables can be deduced simultaneously, given only the zonal state and distribution of physigeographic parameters describing the condition of the earth's surface (including the oceans). Dissert. Abstr.

N79-12615 Illinois Univ. at Urbana-Champaign, Urbana.
THE TROPOSPHERIC FORCING AND VERTICAL PROPAGATION OF STATIONARY PLANETARY WAVES IN THE ATMOSPHERE Ph.D. Thesis
Susan Rykala Avery 1978 150 p
Avail: Univ. Microfilms Order No. 7820895

A quasi-geostrophic, linear, steady state model was developed to examine the tropospheric forcing and the resulting vertical propagation of stationary planetary waves. The model extends from the earth's surface to 100 km. The calculated wave structure in the troposphere is sensitive to changes in the tropospheric static stability. Large values of the static stability inhibit the heat transports in the troposphere by impeding the vertical flow of energy. The wave response in the troposphere and stratosphere is also sensitive to changes in the strength of the polar night jet. This indicates that changes in the ozone content or distribution of the upper atmosphere may lead to climate change.
Dissert. Abstr.

N79-12616 Colorado State Univ., Fort Collins.
CLOUDINESS, THE PLANETARY RADIATION BUDGET, AND CLIMATE Ph.D. Thesis
James Stephen Ellis 1978 138 p
Avail: Univ. Microfilms Order No. 7820849

Satellite planetary radiation budget measurements from the Nimbus 3 satellite for four semi-monthly periods along with a 29 month composite of measurements from six satellites are applied in a quantitative study to evaluate the effect of cloudiness on the planetary radiation budget. Annual and seasonal results are expressed as zonal, hemispherical and global mean values. Results show that for the planet as a whole the effect of present day clouds in reducing the absorbed shortwave flux is larger than their effect in reducing the longwave emitted flux. The difference between the two effects is significantly larger over oceans than over land. Similarly, the sensitivity to changes in cloud amount is greater in the shortwave absorbed flux than in the longwave flux emitted to space. Also, the presence of clouds act to reduce the amplitude of the annual variation of the global planetary net radiation budget. Dissert. Abstr.

N79-12617 Utah State Univ., Logan.
A STUDY OF O2 INFRARED RADIATION IN THE TWILIGHT AIRGLOW Ph.D. Thesis
Ursel Ralph Embry 1978 143 p
Avail: Univ. Microfilms Order No. 7821122

A procedure was developed to predict the emission spectrum of the O2, (0,0) infrared atmospheric band in the airglow at any specified observation site in the lower atmosphere. A photochemical model of the atmosphere between 50 and 100 km altitude was used to estimate the number density of O2 molecules, and the volume emission rate for photons in the O2 (0,0) band. A model of the photon emission process was used to distribute the photons among the spectral lines of the band. The absorption in the lower atmosphere was computed using an absorption line shape obtained by a convolution of the Doppler and Lindholm profiles. The lower atmosphere was approximated by a set of concentric stratified layers with each layer considered to have constant temperature and pressure. Where possible, the initial calculation results were stored for use as precomputed values for repeated spectral calculations.
Dissert. Abstr.

N79-12618 Colorado State Univ., Fort Collins.
TRAVELING PLANETARY WAVES AND THEIR EFFECT ON THE GENERAL CIRCULATION Ph.D. Thesis
Roland Aloysius Madden 1978 84 p
Avail: Univ. Microfilms Order No. 7820866

Evidence of regularly propagating, large scale waves was found in a 73-year record of Northern Hemisphere sea level pressure data and in a nine year record of upper air data. Cross spectrum analyses indicated that south of 50 N, in all seasons, a zonal wave number one disturbance moved westward around the world in five days. In addition, north of 50 N, primarily in winter and spring, a zonal wave number one disturbance moved westward around the world in one to three weeks with an average period near 16 days. The structure of the 16-day wave during winter is studied in detail, and it is shown to be consistent, in many respects, with that of a theoretically predicted free, planetary wave, or wave of the second class. Further evidence is presented that demonstrates that the interaction of a transient, free, planetary wave and a quasi-stationary, forced wave can cause large fluctuations in vertical energy transport and in the total atmospheric energy cycle itself. Dissert. Abstr.

N79-12619 Illinois Univ. at Urbana-Champaign, Urbana.
ION AND ELECTRON TEMPERATURES IN THE TOPSIDE IONOSPHERE Ph.D. Thesis
Donald Edward Munninghoff 1978 271 p
Avail: Univ. Microfilms Order No. 7821214

Experimental and theoretical ion and electron temperatures in the topside ionosphere are investigated. Experimental results come from an analysis of incoherent-scatter data. Consideration of the energy balance equations gives the theoretical ion and electron temperatures. Two ions, O(+) and H(+), were assumed to be the only ions present in the topside ionosphere. Experimental evidence showed that a third ion, He(+) is relatively unimportant compared to O(+) and H(+). Photoionization of neutral particles, charge transfer, and diffusion of these charged particles are the important physical processes which were used to calculate their number density profiles. O(+) and H(+) number densities are shown to affect the O(+), H(+), and electron temperatures. Analysis of theoretical autocorrelation functions of the incoherent-scatter power spectra shows that number densities and temperatures of O(+), H(+), and electrons can be deduced from experimental autocorrelation functions. Dissert. Abstr.

N79-12620 Ohio State Univ., Columbus.
A STUDY OF WATER VAPOR ABSORPTION AT CO2 LASER FREQUENCIES USING A DIFFERENTIAL SPECTROPHONE AND WHITE CELL Ph.D. Thesis
John Curran Peterson 1978 267 p
Avail: Univ. Microfilms Order No. 7819649

Water vapor absorption at CO2 laser frequencies was studied using a differential spectrophone and a long path multiple transversal cell. The results of these measurements were analyzed

in terms of the Lorentz line shape and the far wing model for continuum absorption in the 9-10 micrometers wavelength region. An electronically stabilized, grating tunable cw CO2 laser with a nominal output power of 2 watts was used in performing measurements of water vapor absorption as a function of both pressure and temperature. Pressure broadened studies of H2O in N2 at a total pressure of 1 atm. were performed at 27 CO2 laser lines in the 9.4 and 10.4 micrometers bands. Dissert. Abstr.

N79-12621 Colorado Univ. at Boulder.
A THEORETICAL INVESTIGATION OF THE INTERACTION OF AURORAL ELECTRONS WITH THE ATMOSPHERE Ph.D. Thesis
Knut Henrik Stamnes 1978 232 p
Avail: Univ. Microfilms Order No. 7820561

The interaction of a beam of auroral electrons with the atmosphere is described by the linear transport equation, including discrete energy loss, multiple scattering, and secondary electrons. A solution to the transport equation provides the electron intensity as a function of altitude, pitch angle (with respect to the geomagnetic field), and energy. A multi-stream (discrete ordinate) approximation to the transport equation is utilized, and an essentially analytic solution is obtained in this approximation. This theory provides a framework within which angular distributions can be easily calculated and interpreted. Its applicability to auroral studies is discussed and some suggestions for extensions (e.g., to include the effects of electric fields) and further research are given. Dissert. Abstr.

N79-12622 Brandeis Univ., Waltham, Mass.
QUANTUM SUPERGRAVITY Ph.D. Thesis
John Howard Kay 1978 93 p
Avail: Univ. Microfilms Order No. 7819942

A formal quantization procedure is established (either canonical or the manifestly covariant path-integral method), and the question of divergences is addressed. Using the results from the quantization of other gauge field theories as a guide, it is assumed that once an appropriate locally supersymmetric regularization scheme is found, the local divergences will themselves be locally supersymmetric. It is found that to the one and two loop orders for both pure and extended supergravity, the divergent local counterterms are proportional to field equations. They can therefore be removed by a higher derivative field redefinition. At three loops there exists a non-vanishing counterterm which would not allow the field redefinition to render the theory predictive. Thus, supergravity is non-renormalizable at three loops. Dissert. Abstr.

N79-12623 Purdue Univ., Lafayette, Ind.
ANALYSIS OF THE MAGNETIC ANOMALY MAP OF INDIANA Ph.D. Thesis
Nathaniel Reginald Richardson, Jr. 1978 180 p
Avail: Univ. Microfilms Order No. 7821490

The magnetic anomaly map as well as the upward continued and strike-pass data show predominantly north striking anomalies that abruptly terminate or are deflected at 39 deg N latitude by a major east-west trending minimum. A northeast trending zone called the trans-Indiana rift, which is on strike with the principal trend of epicenters in the New Madrid area and the Wabash River Valley Fault Zone, is recognized on the magnetic anomaly map of Indiana by a change of wavelength characteristics and termination of anomalies. Several large subcircular magnetic anomalies are recognized in eastern Indiana and are tentatively interpreted as shallow volcanic depressions probably caldera-like structures. Depth determinations by spectral analysis indicate magnetic sources at two different depths in Indiana; and internal correspondence analysis of selected profiles across Indiana indicate that in general there is good correlation between the magnetic and gravity anomalies. The northeast trending zone is an exception. Dissert. Abstr.

N79-12624 Purdue Univ., Lafayette, Ind.
SEISMIC AND THERMAL CONSTRAINTS ON THE PHYSICAL PROPERTIES OF THE CONTINENTAL CRUST Ph.D. Thesis
Paul Richard Black 1978 239 p
Avail: Univ. Microfilms Order No. 7821420

A correlation is shown to exist between upper mantle compressional wave velocity (Pn) and heat flow when averaged by province. When temperatures are calculated at the base of the crust from heat flow information, the variation in Pn velocity is found to be within the range expected from laboratory studies of the dependence of Vp on temperature. Since heat flow has been shown to be related to crustal age in the continents, a correlation between heat flow and Pn velocity implies a relationship between Pn velocity and crustal age. Time varying thermal models for the crust are developed in order to investigate some aspects of crustal evolution, and predict the variation of crustal velocities with age. Velocities predicted for high heat flow provinces confirm the results of the simultaneous equation inversion calculations that the differences in seismic profiles between eastern and western North America are due largely to temperature effects. Dissert. Abstr.

N79-12625 California Inst. of Tech., Pasadena.
THE STRUCTURE AND PETROLOGY OF THE SAN JOSE' PLUTON, NORTHERN BAJA CALIFORNIA, MEXICO Ph.D. Thesis
Jay Dennis Murray 1978 795 p
Avail: Univ. Microfilms Order No. 7815975

The San Jose pluton is a 117 sq km syntectonic body of chemically homogeneous biotite-hornblende tonalite in the western part of the Cretaceous Peninsular Range batholith. Contacts with lower Cretaceous volcanic and volcaniclastic wall rocks define a teardrop outline, elongate north-south. The outline of the northern 2/3 is remarkably circular and concordant to isoclinally folded, highly stretched strata. Southward the contact becomes discordant and tapers irregularly to a point. Detailed mapping revealed three texturally distinguishable lithologies emplaced in two or possibly three intrusive pulses: (1) prismatic hornblende tonalite (PHbT) partially enclosed by (2) a horseshoe-shaped shell of stubby hornblende tonalite comprise the northern 2/3 of the pluton; (3) seriate porphyritic tonalite structurally and petrographically gradational into the PHbT forms the discordant southern wedge. Dissert. Abstr.

N79-12626 Ohio State Univ., Columbus.
EARTH ORIENTATION FROM LUNAR LASER RANGE-DIFFERENCING Ph.D. Thesis
Alfred Leick 1978 218 p
Avail: Univ. Microfilms Order No. 7819628

For the optimal use of high precision Lunar Laser Ranging an investigation regarding a clear definition of the underlying coordinate systems, identification of estimable quantities, favorable station geometry and optimal observation schedule is given. The least squares adjustment formulation for range-differencing is presented. This procedure determines the coordinate differences of the stations particulary well by taking advantage of the earth-moon geometry. The body-fixed motions of the celestial pole (polar motion) and the earth rotation parameter are derived from an orthogonal transformation relative to a standard epoch. Dissert. Abstr.

N79-12627 Illinois Univ. at Urbana-Champaign, Urbana.
THEORETICAL AND EXPERIMENTAL STUDIES OF THE ATMOSPHERIC SODIUM LAYER Ph.D. Thesis
Eric Stephen Richter 1978 266 p
Avail: Univ. Microfilms Order No. 7821231

Atmospheric atomic sodium was observed over Urbana using a laser radar system tuned to 589 nm. Wavelike structures in the sodium layer was observed with typical wavelengths of 3-15 km and downward phase velocities of 1-3 m s superscript-1. On one occasion there was evidence for the presence of a standing wave in the layer. During two successive evenings the bottomside of the layer was observed to undulate with a period of about 2 1/2 hours. In agreement with worldwide measurements the layer was observed to broaden through the night. A meteor ablation-cluster ion theory of sodium was developed and found to be in good agreement with existing atmospheric observations as well as laboratory measurements of rate constants. Sodium is removed from the mesosphere in the form of higher order cluster ions which eventually undergo sedimentation to the lower atmosphere. Dissert. Abstr.

N79-12628 Purdue Univ., Lafayette, Ind.
STANDARDIZATION OF CELL SIZE FOR ENVIRONMENTAL GEOLOGY DATA BASE AND GENERATION OF DECISION MAKING CRITERIA FOR LAND USE PLANNING Ph.D. Thesis
Syed Eqbal Hasan 1978 295 p
Avail: Univ. Microfilms Order No. 7821453

Continued increase in world population has resulted in rapid urbanization throughout the world. Traditional land use planning is considered lacking in the sense that it usually disregards or gives little consideration to the physical aspects of the land. A computerized data base is developed for the southeastern part of Boone county, Indiana, using grid cells for data registration. Choice of cell size for data digitization is analyzed. A set of decision-making criteria is evolved for most of the common types of land use. These criteria are based on engineering geologic judgement and take into account the input from experts in disciplines involving land use. The procedures adopted for data registration and computer modelling are presented. The need to improve computer software for more efficient data processing is indicated. Dissert. Abstr.

N79-12629 Oregon State Univ., Corvallis.
APPLICATIONS OF SOURCE SIGNATURE DECONVOLUTION TO AIRGUN SEISMIC PROFILING AND THE MEASUREMENT OF ATTENUATION FROM REFLECTION SEISMOGRAMS Ph.D. Thesis
Keith Howard Wrolstad 1978 335 p
Avail: Univ. Microfilms Order No. 7824541

Deterministic source signature deconvolution is applied to the processing of marine wide angle and vertical profiler data with airgun sources. Optimum results are obtained with a source signature measured by stacking the signal reflected from a relatively homogeneous abyssal plain sedimentary environment. Improved resolution of reflection event timing allows the computation of more reliable interval velocities by the T square - X square method. Accurate timing of primary reflection events in the deconvolved vertical profiler data permits computation of frequency dependent attenuation by univariate least-squares regression in the Fourier transform domain. The technique successfully extracts input amplitude attenuation functions from model reflection coefficient sequences with additive random noise. Dissert. Abstr.

N79-12630*# Ohio State Univ. Research Foundation, Columbus.
MEAN GRAVITY ANOMALIES AND SEA SURFACE HEIGHTS DERIVED FROM GEOS-3 ALTIMETER DATA Final Report
Richard H. Rapp Oct. 1978 121 p refs
(Contract NAS6-2484)
(NASA-CR-156843) Avail: NTIS HC A06/MF A01 CSCL 08E

Approximately 2000 GEOS-3 altimeter arcs were analyzed to improve knowledge of the geoid and gravity field. An adjustment procedure was used to fit the sea surface heights (geoid undulations) in an adjustment process that incorporated cross-over constraints. The error model used for the fit was a one or two parameter model which was designed to remove altimeter bias and orbit error. The undulations on the adjusted arcs were used to produce geoid maps in 20 regions. The adjusted data was used to derive 301 5 degree equal area anomalies and 9995 1 x 1 degree anomalies in areas where the altimeter data was most dense, using least squares collocation techniques. Also emphasized was the ability of the altimeter data to imply rapid anomaly changes of up to 240 mgals in adjacent 1 x 1 degree blocks. Author

N79-12631*# Battelle Columbus Labs., Ohio.
DETAILED GRAVITY ANOMALIES FROM GEOS-3 SATELLITE ALTIMETRY DATA Final Report
G. S. Gopalapillai and A. G. Mourad Oct. 1978 48 p refs
(Contract NAS6-2801)
(NASA-CR-156844) Avail: NTIS HC A03/MF A01 CSCL 08E

A technique for deriving mean gravity anomalies from dense altimetry data was developed. A combination of both deterministic and statistical techniques was used. The basic mathematical model was based on the Stokes' equation which describes the analytical relationship between mean gravity anomalies and geoid undulations at a point; this undulation is a linear function of the altimetry data at that point. The overdetermined problem resulting from the excessive altimetry data available was solved using Least-Squares principles. These principles enable the simultaneous estimation of the associated standard deviations reflecting the internal consistency based on the accuracy estimates provided for the altimetry data as well as for the terrestrial anomaly data. Several test computations were made of the anomalies and their accuracy estimates using GOES-3 data. S.B.S.

N79-12632*# Colorado Univ. at Boulder. Lab. for Atmospheric and Space Physics.
SOLAR MESOSPHERE EXPLORER: EXPERIMENT DESCRIPTION
1977 110 p
(Contract JPL-954617)
(NASA-CR-157943) Avail: NTIS HC A06/MF A01 CSCL 04A

The Solar Mesosphere Explorer (SME) satellite experiments will provide a comprehensive study of atmospheric ozone and the processes which form and destroy it. Five instruments to be carried on the spacecraft will measure the ozone density and altitude distribution, monitor the incoming solar radiation, and measure other atmospheric constituents which affect ozone. The investigative approach concept, methods and procedures, preflight studies, and orbits and mission lifetime are presented. Descriptions of the instruments are also presented. G.Y.

N79-12633*# Bergen Univ. (Norway). Dept. of Physics.
MULTIPLE-SATELLITE STUDIES OF MAGNETOSPHERIC SUBSTORMS: PLASMA SHEET RECOVERY AND THE POLEWARD LEAP OF AURORAL-ZONE ACTIVITY
T. Pytte, R. L. McPherron (California Univ., Los Angeles), M. G. Kivelson (California Univ., Los Angeles), H. I. West, Jr. (California Univ., Lawrence Livermore Lab.), and E. W. Hones, Jr. (Los Alamos Scientific Lab., New Mexico) Dec. 1977 55 p refs Submitted for publication
(Grants NGL-05-007-004; N00014-69-A-0200-4016; NSF DE-575-10678)
(NASA-CR-157617; S/TR-105) Avail: NTIS HC A04/MF A01 CSCL 04A

Particle observations from pairs of satellites (Ogo 5, Vela 4A and 5B, Imp 3) during the recovery of plasma sheet thickness late in substorms were examined. Six of the nine events occurred within about 5 min in locations near the estimated position of the neutral sheet, but over wide ranges of east-west and radial separations. The time of occurrence and spatial extent of the recovery were related to the onset (defined by ground Pi 2 pulsations) and approximate location (estimated from ground mid-latitude magnetic signatures) of substorm expansions. It was found that the plasma sheet recovery occurred 10 - 30 min after the last in a series of Pi bursts, which were interpreted to indicate that the recovery was not due directly to a late, high latitude substorm expansion. The recovery was also observed to occur after the substorm current wedge had moved into the evening sector and to extend far to the east of the center of the last preceding substorm expansion. Author

N79-12634*# Ohio State Univ., Columbus.
MEAN GRAVITY ANOMALIES AND SEA SURFACE HEIGHTS DERIVED FROM GEOS-3 ALTIMETER DATA Final Report
Richard H. Rapp Oct. 1978 117 p refs
(Contract NAS6-2484)
(NASA-CR-156843) Avail: NTIS HC A06/MF A01 CSCL 08C

Approximately 2000 GEOS-3 altimeter arcs, were analyzed to improve knowledge of the geoid and gravity field. The first step in this process was a complex editing procedure used to eliminate bad and unacceptable data. After this, an adjustment procedure was used to fit the sea surface heights (geoid undulations) implied by the altimeter data to the geoid undulations implied by the GEM 9 potential coefficients, in an adjustment process that incorporated crossover constraints. The error model used for the fit was a one or two parameter model which was designed to remove altimeter bias and orbit error. The adjustment process was carried out in two stages: first in a primary net of

global data in 854 arcs; second in six regional areas. Typical a priori crossover discrepancies were + or - 8 meters while a posteriori discrepancies were on the order of + or - 0.6 meters. Author

N79-12635*# Wyoming Univ., Laramie. Dept. of Physics and Astronomy.
A STRATOSPHERIC AEROSOL MODEL WITH PERTURBATIONS INDUCED BY THE SPACE SHUTTLE PARTICULATE EFFLUENTS Final Report
J. M. Rosen and D. J. Hofmann Jul. 1977 38 p refs
(Grant NsG-7207)
(NASA-CR-157950; AP-39) Avail: NTIS HC A03/MF A01 CSCL 04A

A one dimensional steady state stratospheric aerosol model is developed that considers the subsequent perturbations caused by including the expected space shuttle particulate effluents. Two approaches to the basic modeling effort were made: in one, enough simplifying assumptions were introduced so that a more or less exact solution to the descriptive equations could be obtained; in the other approach very few simplifications were made and a computer technique was used to solve the equations. The most complex form of the model contains the effects of sedimentation, diffusion, particle growth and coagulation. Results of the perturbation calculations show that there will probably be an immeasurably small increase in the stratospheric aerosol concentration for particles larger than about 0.15 micrometer radius. G.G.

N79-12636*# Ohio State Univ., Columbus. Research Foundation.
THE DETERMINATION OF GRAVITY ANOMALIES FROM GEOID HEIGHTS USING THE INVERSE STOKES' FORMULA, FOURIER TRANSFORMS, AND LEAST SQUARES COLLOCATION
Reiner Rummel, Lars Sjoberg, and Richard H. Rapp Wallops Island, Va. NASA. Wallops Flight Center Aug. 1978 67 p refs
(Contract NAS6-2484)
(NASA-CR-141442) Avail: NTIS HC A04/MF A01 CSCL 08N

A numerical method for the determination of gravity anomalies from geoid heights is described using the inverse Stokes formula. This discrete form of the inverse Stokes formula applies a numerical integration over the azimuth and an integration over a cubic interpolatory spline function which approximates the step function obtained from the numerical integration. The main disadvantage of the procedure is the lack of a reliable error measure. The method was applied on geoid heights derived from GEOS-3 altimeter measurements in the calibration area of the GEOS-3 satellite. Author

N79-12637# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
PREDICTABILITY OF UPPER-ATMOSPHERIC DENSITY AND COMPOSITION
Joe M. Straus and D. R. Hickman 22 Nov. 1978 34 p refs
(ATR-79(9553)-1) Avail: NTIS HC A03/MF A01

Empirical models of upper-atmospheric density and composition are described. Studies in which predictions of these models were compared with observational data are reviewed. A discussion concerning the usefulness and accuracy of the models is given to allow a user to choose the most appropriate model for his particular needs. S.B.S.

N79-12638# Lincoln Lab., Mass. Inst. of Tech., Lexington.
SEISMIC DISCRIMINATION Semiannual Technical Summary Report, 1 Oct. 1977 - 31 Mar. 1978
Michael A. Chinnery 31 Mar. 1978 79 p refs
(Contract F19628-78-C-0002; ARPA Order 512)
(AD-A057279; ESD-TR-78-64) Avail: NTIS HC A05/MF A01 CSCL 17/10

This report describes 23 investigations in the field of seismic discrimination. These are grouped as follows: regional seismic studies (13 contributions), miscellaneous studies (6 contributions), and recent developments in our data and computer systems (4 contributions). Author (GRA)

N79-12639# Naval Ocean Systems Center, San Diego, Calif.
MAGNETIC SUBSTORMS AND IONOSPHERIC STORMS. A MEASUREMENT NETWORK COVERING AT LEAST THE ENTIRE PACIFIC AREA IS SEEN AS THE KEY TO THE DEVELOPMENT OF COMPLETE STORM MORPHOLOGIES AND A PREDICTION CAPABILITY Interim Report, Feb. 1976 - Jan. 1978
P. E. Argo, J. R. Hill, and I. J. Rothmuller 15 May 1978 40 p refs
(ZF52551001)
(AD-A057975; NOSC/TR-256) Avail: NTIS HC A03/MF A01 CSCL 04/1

Geomagnetic and ionospheric variations are extremely important to the Navy because many C3 and surveillance systems depend upon the stability of the geomagnetic field and ionosphere for reliable operation. For example, rapid geomagnetic pulsations may obscure submarines from our ASW detectors, and ionospheric storm depletions or enhancements of the F-region may compromise covert Naval communications. To alleviate the damaging effects of these variations, a real-time environmental prediction/assessment system must be developed with inputs into a model describing effects of the variations on the system. This report documents the present understanding of both magnetospheric substorms and ionospheric storms, and suggests a program to expedite the development of an operational model for Naval use. Magnetospheric substorms appear to be the causative mechanism of the global ionospheric storm. A digest of the major models of magnetospheric substorms is presented in chapter 1. Chapter 2 discusses the ionospheric storms that are identified with magnetospheric substorms. Author (GRA)

N79-12640# California Univ., Berkeley. Space Sciences Lab.
ELECTRON PRECIPITATIONS AND POLAR AURORAS
Ching I. Meng Apr. 1978 134 p refs
(Contract F49620-78-C-0035)
(AD-A058090; AFOSR-78-1205TR) Avail: NTIS HC A07/MF A01 CSCL 04/1

In the first part a brief historical review of the progress of our knowledge of the precipitation of auroral electrons is given. Observations by different techniques, in terms of detectors aboard balloons, sounding rockets, and polar-orbiting satellites are reviewed. The precipitation morphology is examined in terms of synoptic statistical results and of latitudinal survey along individual satellite passes. In the second part, a large number of simultaneous observations of auroras and precipitating auroral electrons by DMSP satellites are examined in detail, and it is shown that precipitation characteristics of auroral electrons are distinctly different for the discrete aurora and the diffuse aurora. In the third part, the source region of auroral electrons is discussed by comparing the auroral electron precipitation at low altitudes observed by DMSP satellites with the simultaneous ATS-6 observations near the magnetospheric equatorial plane approximately along the same geomagnetic field line. It is shown that the diffuse aurora is caused by direct dumping of the plasma sheet electrons from the equatorial region, whereas discrete auroras require acceleration of electrons between the plasma sheet and the polar atmosphere. The parallel electric field along the geomagnetic field line above the ionosphere is a likely candidate for the acceleration mechanism. Author (GRA)

N79-12641# Air Force Geophysics Lab., Hanscom AFB, Mass.
AIRGLOW CALCULATIONS FOR REMOTE SENSING OF DENSITY
Roger A. VanTassel 5 May 1978 20 p refs
(AD-A057478; AFGL-TR-78-0115) Avail: NTIS HC A02/MF A01 CSCL 04/1

An instrument to remotely determine neutral density profiles in the lower thermosphere has been developed. The instrument observes ultraviolet airglow profiles in two bands: the 3371 A band for nitrogen and the 1356 A band for atomic oxygen to infer atmospheric density. Calculations of the intensities of these emissions have been made using the recent computations of energy dependent photoelectron fluxes and experimental determinations of the excitation cross section. GRA

N79-12642# Texas Univ. at El Paso. Dept. of Electrical Engineering.
ELECTRICAL CONDUCTIVITY MEASUREMENTS IN THE

STRATOSPHERE USING BALLOON-BORNE BLUNT PROBES Final Report, 18 Sep. 1972 - 25 Sep. 1975
J. D. Mitchell and L. C. Hale Jun. 1978 22 p refs
(Contract DAAD07-74-C-0263; Grant DAHC04-75-G-0031; DA Proj. 1L1-61102-B-53A)
(AD-A057441; ERADCOM/ASL-CR-78-0263-2) Avail: NTIS HC A02/MF A01 CSCL 04/1

Blunt probes for measuring polar electrical conductivity have been flown on the recent series of STRATCOM balloon experiments. Although the instrument has primarily been employed with rocket systems, it has been found useful for studying ionization processes in the stratosphere when flown on balloon platforms. The three most recent balloon flights floated in different altitude regions of the stratosphere. These made possible the study of conductivity and its associated variability at relatively fixed altitudes of 48 km, 28 km, and 39 km. Another function of the blunt probe was to measure the ionization effects caused by an ultraviolet lamp which was operated for designated time periods during the balloon flights. In conjunction with the 28 km balloon flight, a rocket-launched parachute-borne blunt probe experiment was conducted nearby, thus providing an altitude profile for electrical conductivity to supplement the data obtained from the balloon-borne instrument. General agreement was observed between the rocket data and the corresponding balloon measurements. GRA

N79-12643# Naval Research Lab., Washington, D. C.
LOWER-HYBRID-DRIFT WAVE TURBULENCE IN THE DISTANT MAGNETOTAIL
J. D. Huba, N. T. Gladd, and K. Papadopoulos May 1978 53 p refs
(RR0330242)
(AD-A058245; AD-E000190; NRL-MR-3766) Avail: NTIS HC A04/MF A01 CSCL 04/1

Recent satellite observations of electrostatic and magnetic noise in the distant magnetotail (Gurnett et al., 1976) can be explained by the excitation of the lower-hybrid-drift instability. In particular it is shown that (1) existence conditions for the lower-hybrid-drift instability are met, (2) the observed frequency spectra and polarization are in good agreement with the predictions of linear theory, and (3) the observed amplitudes of fluctuations are consistent with the nonlinear theory of this mode. Moreover, the observation of this instability suggests that the anomalous transport properties associated with these waves, which are important in many laboratory devices, may play a crucial role in the macroscopic evolution of magnetotail processes such as field line merging, tearing instabilities or 'fireballs.' Author (GRA)

N79-12644# Naval Research Lab., Washington, D. C. Plasma Physics Div.
HIGH FREQUENCY DRIFT WAVES WITH WAVELENGTHS BELOW THE IRON GYRORADIUS IN EQUATORIAL SPREAD F Interim Report
J. D. Huba, P. K. Chaturvedi, Sidney L. Ossakow, and D. M. Towle (Lincoln Lab., Lexington, Mass.) May 1978 35 p refs
(AD-A058246; NRL-MR-3768) Avail: NTIS HC A03/MF A01 CSCL 04/1

Evidence is given for intense VHF and UHF radar backscatter during equatorial Spread F resulting from irregularities of 1 meter and 36 cm, respectively. The linear theory for high frequency drift waves, generated by the drift-cyclotron and lower-hybrid-drift instabilities, is presented. This linear theory is set forth as a possible explanation for the occurrence of these irregularities below the ion gyroradius. The maximum growth for these instabilities occurs for kr sub e approximately 1, where k is the wavenumber perpendicular to the magnetic field and r sub e is the electron gyroradius. For these instabilities, the growth rate results in growth times than a second. For typical equatorial Spread F ionospheric parameters, the lower-hybrid-drift instability is dominant. GRA

N79-12645# Air Force Geophysics Lab., Hanscom AFB, Mass.
VARIABILITY OF THE LOWER THERMOSPHERE DETERMINED FROM SATELLITE ACCELEROMETER DATA
Frank A. Marcos, Robert E. McInerney, and Robert W. Fioretti 25 May 1978 47 p refs
(AD-A058982; AFGL-TR-78-0134; AFGL-ERP-633) Avail: NTIS HC A03/MF A01 CSCL 04/1

An extensive atmospheric density data base has been developed using accelerometer results from four low altitude satellites. The altitude range of the data is from 250 km down to as low as 140 km, with latitude coverage from 90 N to 90 S and local time periods that cover several 24-hr cycles. The data were obtained over a wide range of geomagnetic activity conditions. Solar radiation, as indicated by the 10.7-cm flux, was generally very low. Hence the data base applies mainly to solar minimum conditions. A description of the satellites, the accelerometer experiment, and the data base is given. Density variability is statistically analyzed in relation to selected atmospheric models. Particular attention is given to deviations from a normal distribution. Frequency distribitons of the data are described in terms of the mean value and the second, third, and fourth moments about the mean. This provides a more accurate description of extreme variations. The statistical properties of atmospheric variability are analyzed as a function of geomagnetic activity, latitude, altitude, and local time to develop a quantitative knowledge of unmodeled density variations. The results show that these accelerometer data will permit significant improvement in understanding the variations in the lower thermospheric density. GRA

N79-12646# Aerospace Corp., El Segundo, Calif. Ivan A. Getting Labs.
AURORAL PULSATIONS FROM ATMOSPHERIC WAVES Interim Report
Janet G. Luhmann 22 Aug. 1978 32 p refs
(Contract F04701-77-C-0078)
(AD-A058834; TR-0078(3960-05)-11; SAMSO-TR-78-109) Avail: NTIS HC A03/MF A01 CSCL 04/1

A model of the quasiperiodic pulsating aurora (pulsation periods greater than 1s) is proposed in which pressure waves in the neutral atmosphere are invoked as the driver of the brightness fluctuations. If the isodensity surfaces of the local atmosphere become nonplanar, a horizontal movement of the atmosphere can cause the energy deposition by a steady particle distribution to vary with time. When the distortions are wavelike corrugations, and the horizontal motion is steady and also has a component normal to the phasefront, periodic variations in auroral brightness can result. The pulse shape and magnitude of the pulsations depend on both the energy spectrum and pitch angle distribution of the particle and the amplitude and altitude distribution of the atmospheric waves. This model, which attributes variable precipitation to a temporally changing local loss cone, is in sharp contrast to models which require temporal changes in the particle source above the atmosphere. Many of the observed features of pulsating aurorae can be explained by the present model. It is suggested that the required atmospheric oscillations can be provided by acoustic-gravity waves that are generated by active arcs near the poleward edge of the auroral oval. This mechanism can also produce aperiodic pulsations by convection of irregular atmospheric density fluctuations, which may result from interfering acoustic-gravity wave trains.
Author (GRA)

N79-12647# California Univ., Livermore. Lawrence Livermore Lab.
ATMOSPHERIC STATISTICAL DYNAMIC MODELS. CLIMATE EXPERIMENTS: ALBEDO EXPERIMENTS WITH A ZONAL ATMOSPHERIC MODEL
G. L. Potter, H. W. Ellsaesser, M. C. MacCracken, and F. M. Luther Jun. 1978 12 p refs Presented at GARP Joint Organizing Comm. Study Conf. on Climate Models, Wash., D. C., 3-7 Apr. 1978
(Contract W-7405-eng-48)
(UCRL-81284; Conf-780472-2) Avail: NTIS HC A02/MF A01

The zonal model experiments with modified surface boundary conditions suggest an initial chain of feedback processes that is largest at the site of the perturbation. Although the two experiments give similar overall global results, the location of the perturbation plays an important role in determining the response of the global circulation. These two-dimensional model results are also consistent with three-dimensional model experiments. These results indicate the possibility that self-induced growth of the subtropical deserts could serve as a possible mechanism to cause the initial global cooling that then initiates

a glacial advance thus activating the positive feedback loop involving ice-albedo feedback (also self-perpetuating). Reversal of the cycle sets in when the advancing ice cover forces the wave-cyclone tracks far enough equatorward to quench (revegetate) the subtropical deserts. DOE

N79-12648# Geological Survey, Tallahassee, Fla. Water Resources Div.
GEOHYDROLOGIC EVALUATION OF A LANDFILL IN A COASTAL AREA, ST. PETERSBURG, FLORIDA Final Water-Resources Investigations
C. B Hutchinson and J. W. Stewart Feb. 1978 47 p refs
(PB-283786/2; USGS-WRD-WRI-78/041; USGS-WRI-77-78) Avail: NTIS HC A03/MF A01 CSCL 13B

The 250 acre Toytown landfill site is in a poorly drained area in coastal Pinellas County, Florida. Average altitude of land surface at the landfill is less than 10 feet. About 1000 tons of solid waste and about 200,000 gallons of digested sewage sludge are disposed of daily at the landfill. The velocity of ground water flow through the 23-foot thick surficial aquifer northeast from the landfill toward Old Tampa Bay probably ranges from 1 to 10 feet per year. The horizontal and vertical flow velocities indicate that leachate moves slowly downgradient, and that leachate has not yet seeped through the confining bed after 12 years of landfill operation. Untreated surface run-off from the site averages about 15 inches per year, and ground-water outflow averages about 3.3 inches per year. The Floridan aquifer is used as a limited source of water for domestic supply in this area. GRA

N79-12649# California Univ., Berkeley. Dept. of Civil Engineering.
JTROCK: A COMPUTER PROGRAM FOR STRESS ANALYSIS OF THE TWO-DIMENSIONAL, DISCONTINUOUS ROCK MASSES
Marc Hittinger and Richard E. Goodman May 1978 152 p refs
(Grant NSF ENG-74-12407)
(PB-284144/3; UCB/GT-78/04) Avail: NTIS HC A08/MF A01 CSCL 08G

The program allows solution of many practical geological engineering problems. Different load sequences permit stages of construction or excavation to be modeled with reinforcement at intermediate times. Various types of elements allow simulation of most geological features affecting properties of an engineering site. GRA

N79-12650# California Univ., Richmond. Earthquake Engineering Research Lab.
SEISMIC BEHAVIOR OF TALL LIQUID STORAGE TANKS
Akira Niwa Feb. 1978 333 p refs Sponsored by Chevron Oil Field Research Co., LaHabra, Calif.
(PB-284017/1; UCB/EERC-78/04) Avail: NTIS HC A15/MF A01 CSCL 13D

The results of an experimental program in which a scaled model of a ground supported, thin-shell, cylindrical liquid storage tank with height greater than radius was subjected to simulated earthquake excitation are discussed. Analytical investigations on out-of-round shell deformation of cylindrical tanks are also presented. This experimental program was the second phase of a research project in which various scaled tank models were tested to assess the applicability of current seismic design practice to ground supported, thin-shell, cylindrical liquid storage tanks. GRA

N79-12651# SRI International Corp., Menlo Park, Calif.
RESULTS OF RESEARCH RELATED TO STRATOSPHERIC OZONE PROTECTION
R. E. Ruff, P. B. Russell, D. Kaplan, B. R. Holt, and J. W. Ryan Jan. 1978 50 p refs
(Contract EPA-68-01-3939)
(PB-284400/9; SRI-6806; EPA-600/8-78-002) Avail: NTIS HC A03/MF A01 CSCL 04A

Activities include surveys of skin cancer among populations at different latitudes, measurements of solar UV-B (290-320nm) at the sites, tests of over 100 plant species under simulated and natural UV-B levels, experiments with aquatic ecosystems, and social/economic workshops. Results to date are as follows: (1) surveys generally support belief that skin cancer incidence is related to UV-B exposure; (2) mortality from skin cancer is increasing among the young, probably due to changes in life style-more time outdoors; (3) all plants tested are sensitive to UV-B at some exposure level; (4) some plants are stunted, others suffer bleached or discolored leaves; (5) UV-B damages larvae of shrimp, crab, mackerel and anchovy; (6) photorepair mechanism is suggested as a potential mitigator of UV-B effects in plants; (7) field type, medium resolution spectroradiometer and calibration standards were developed; and (8) a conceptual model, including parameter uncertainties, is developed for integrated assessment of coasts/benefits of control vs. non-control. GRA

N79-12491# Technische Hochschule, Darmstadt (West Germany). Inst. of Physical Geodesy.
THE PRESENT (1977) STATE OF THE ART IN GRAVIMETRY
E. Groten *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 131-136 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12492# Geodetic Inst., Charlottenlund (Denmark).
COLLOCATION AND LEAST SQUARES METHODS AS A TOOL FOR HANDLING GRAVITY FIELD DEPENDENT DATA OBTAINED THROUGH SPACE RESEARCH TECHNIQUES
C. C. Tscherning *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 141-149 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12493# Technische Hochschule, Darmstadt (West Germany). Inst. of Physical Geodesy.
ON THE CONTROLLABILITY OF SPACEBORNE GRADIOMETRY BY TERRESTRIAL GRADIENTS
Guenter W. Hein *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 151-152 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12494# Technische Universitaet, Munich (West Germany). Sonderforschungsbereich 78.
THE USE OF SATELLITE-TO-SATELLITE TRACKING FOR GRAVITY PARAMETER RECOVERY
R. Rummel, C. Reigber, and K. H. Ilk *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 153-161 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12495# Johann-Wolfgang-Goethe-Universitat, Frankfurt am Main (West Germany). Inst. fuer Meteorologie und Geophysik.
PLATE MOTIONS AND GRAVITY
W. R. Jacoby *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 163-167 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12497# Geodetic Inst., Helsinki (Finland).
ON THE GRAVIMETRIC SURVEY OF THE GULF OF BOTHNIA
Juhani Kakkuri *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 171-173 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12498# Belgian Royal Observatory, Uccle.
EARTH KINEMATICS. GENERAL REVIEW OF NEEDS, TECHNIQUES AND FUTURE POSSIBILITIES
P. Paquet *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 181-187 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12499# Centre National d'Etudes Spatiales, Toulouse (France). Groupe de Recherches de Geodesie Spatiale.
EARTH'S VARIABLE RATE OF ROTATION AND POLAR WOBBLE
Anny Cazenave *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 189-197 refs (For primary document see

N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12500# Kiel Univ. (West Germany). Inst. fuer Geophysik.
WHAT KIND AND WHAT MAGNITUDE OF CREEP MOVEMENTS TAKE PLACE AT THE EARTH'S SURFACE?
R. Meissner *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 205-211 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12501# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
REVIEW OF SATELLITE TRACKING TECHNIQUES PROBABLY CAPABLE OF MONITORING PLATE TECTONICS
D. Lelgemann *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 213-217 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12503# Technische Hochschule, Darmstadt (West Germany). Inst. of Physical Geodesy.
GEODETIC HIGH PRECISION MEASUREMENTS IN ACTIVE TECTONIC AREAS
E. Groten and G. W. Hein *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 223-229 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12504# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Geodesy.
ANALYSIS OF SATELLITE DATA FOR A STUDY OF CRUSTAL MOVEMENTS
A. Bjerhammar *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 231-233 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12505# Newcastle-upon-Tyne Univ. (England). Inst. of Lunar and Planetary Sciences.
REVIEW OF SPACE STUDIES OF THE GEOMAGNETIC FIELD
S. K. Runcorn *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 241-243 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N79-12652 Colorado State Univ., Fort Collins.
PARAMETERIZATION OF MID-LATITUDE ORGANIZED CONVECTION Ph.D. Thesis
James Michael Fritsch 1978 166 p
Avail: Univ. Microfilms Order No. 7820853

Mass, moisture and energy budgets, vertical circulations, and large scale controls of mid-latitude organized convection are discussed within the framework of cumulus parameterization theory. A model of deep mid-latitude convection, embedded in vertical wind shear, is presented and applied in the formulation of a new cumulus parameterization technique. The parameterization procedure uses the buoyant energy available to a parcel as the primary control on the amount of convective mass transport. Moist downdrafts, vertical transports of horizontal momentum and warming by compensating subsidence are explicitly included in the parameterization formulation. The parameterization technique is tested in a three dimensional mesoscale primitive equation model. Results of the model integration indicate that the parameterization is capable of producing mesoscale structures similar to those observed during actual squall line development. Dissert. Abstr.

N79-12653 Hawaii Univ., Honolulu.
A NUMERICAL STUDY OF THE EFFECT OF CLOUD NUCLEI ON THE INITIATION OF RAIN FROM WARM CLOUDS Ph.D. Thesis
Seung-Man Lee 1978 97 p
Avail: Univ. Microfilms Order No. 7820429

The effects of cloud nucleus size distribution and number concentration on rain initiation from shallow maritime warm clouds are examined in a one-dimensional, time-dependent cylindrical cloud model. Calculations include nucleation, condensation on both nuclei and drops, collection of drops and scavenging of nucleus-size particles to drops. It was found that nuclei of mass about 10 to the minus 15 power g are most efficient for warm rain development and the number concentration normally observed near Hawaii is the optimum concentration for maximum rainfall. Dissert. Abstr.

N79-12654*# Chicago Univ., Ill. Dept. of the Geophysical Sciences.
A KINEMATIC INVESTIGATION OF THE INFLUENCE OF ANVIL AIR FLOW OVER CONVECTIVE NEPHSYSTEMS ON HIGH-LEVEL HORIZONTAL FLOW
Ekundayo E. Balogun (Ife Univ., Nigeria) Jul. 1977 20 p refs (Grant NGR-14-001-008; NOAA-04-4-158-1)
(NASA-CR-157426; SMRP-160) Avail: NTIS HC A02/MF A01 CSCL 04B

The interactions between horizontal ambient flow and divergent wind fields, such as those that obtain atop cumulonimbus complexes, were investigated (theoretically) kinematically. The following were observed from the results of the analyses. First, for a particular divergent field, the relative mass flux over the area of the nephsystem decreased as the strength of the horizontal flow increased. Secondly, while in some of the cases analyzed the interaction between the two flows only resulted in the fanning out of streamlines and a slight redistribution in the wind speed, in many cases backflows and a total reorganization of the wind field occurred. Backflows have a blocking effect on the horizontal flow. Some of the computed patterns were compared with upper level cloud vectors (from geostationary satellite photographs). The comparison indicated that the computed resultant wind field could be used to explain some features of such satellite-derived wind fields. Author

N79-12655*# RCA Service Co., John F. Kennedy Space Center, Fla.
A PRELIMINARY TEST OF THE APPLICATION OF THE LIGHTNING DETECTION AND RANGING SYSTEM (LDAR) AS A THUNDERSTORM WARNING AND LOCATION DEVICE FOR THE FHA INCLUDING A CORRELATION WITH UPDRAFTS, TURBULENCE, AND RADAR PRECIPITATION ECHOES
Horst A. Poehler 5 Dec. 1978 34 p refs
(Contract NAS10-9130)
(NASA-CR-154629) Avail: NTIS HC A03/MF A01 CSCL 04B

Results of a test of the use of a Lightning Detection and Ranging (LDAR) remote display in the Patrick AFB RAPCON facility are presented. Agreement between LDAR and radar precipitation echoes of the RAPCON radar was observed, as well as agreement between LDAR and pilot's visual observations of lightning flashes. A more precise comparison between LDAR and KSC based radars is achieved by the superposition of LDAR precipitation echoes. Airborne measurements of updrafts and turbulence by an armored T-28 aircraft flying through the thunderclouds are correlated with LDAR along the flight path. Calibration and measurements of the accuracy of the LDAR System are discussed, and the extended range of the system is illustrated. Author

N79-12656*# Systems Technology, Inc., Mountain View, Calif.
A STUDY OF KEY FEATURES OF THE RAE ATMOSPHERIC TURBULENCE MODEL
Wayne F. Jewell and Robert K. Heffley Oct. 1978 84 p refs (Contract NAS2-9942)
(NASA-CR-152194; STI-TR-1126-1) Avail: NTIS HC A05/MF A01 CSCL 04B

A complex atmospheric turbulence model for use in aircraft simulation is analyzed in terms of its temporal, spectral, and

statistical characteristics. First, a direct comparison was made between cases of the RAE model and the more conventional Dryden turbulence model. Next the control parameters of the RAE model were systematically varied and the effects noted. The RAE model was found to possess a high degree of flexibility in its characteristics, but the individual control parameters are cross-coupled in terms of their effect on various measures of intensity, bandwidth, and probability distribution. G.G.

N79-12657# National Weather Service, Silver Spring, Md. Techniques Development Lab.
A PLAN FOR IMPROVED SHORT-RANGE AVIATION WEATHER FORECASTS Final Report
Richard L. Crisci Jun. 1978 48 p refs
(Contract DOT-FA67WAI-131)
(AD-A059020; FAA-RD-78-73) Avail: NTIS HC A03/MF A01 CSCL 01/3

The aviation weather needs for terminal and enroute aircraft operations are presented; the nature and interrelationships of the National Weather Service with the military and civilian weather services are described; and methods of improving aviation weather forecasts are discussed. Recommendations are made for the overall improvement of the short-range (0-4 hours) forecast system and for improved forecasts of specific aviation weather phenomena. Author

N79-12658# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
VERTICAL STRUCTURE IN ATMOSPHERIC FOG AND HAZE AND ITS EFFECTS ON IR EXTINCTION
R. G. Pinnick, D. L. Hoihjelle, G. Fernandez, E. B. Stenmark, J. D. Lindberg, S. G. Jennings, and G. B. Hoidale Jul. 1978 144 p refs
(DA Proj. 1L1-61102-D-53A)
(AD-A058127; ERADCOM/ASL-TR-0010) Avail: NTIS HC A07/MF A01 CSCL 04/2

Vertical structure of the size distribution and number concentration of particulates in atmospheric fog and haze near Grafenwoehr, West Germany, was measured with a balloon-borne light-scattering aerosol counter for periods spanning parts of 8 days in February 1976. The work was part of a US Army field exercise conducted for the purpose of determining the effect of atmospheric constituents on various night vision systems. For haze (approximately 5 km visibility) conditions, little vertical variation is seen; but for low visibility (-1 km) fog conditions, significant vertical increases in concentration of droplets with radii larger than 4 micrometers are seen over the first 150 m altitude. Liquid water content values for haze and fog range from 0.0001 to 0.45 g/cu m. Extinction calculated from the particle size distributions shows an approximate 1/lambda wavelength dependence for haze conditions, but nearly neutral (wavelength independent) extinction for heavy fog. A correlation exists between calculated particulate extinction and calculated liquid water content, independent of particle size distribution, for the fogs and hazes studied. GRA

N79-12659# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
THE 19302A GSRS. MISSILE NUMBERS V-7/V-8, ROUND NUMBERS V-7/V-8 Meteorological Data Report
May 1978 26 p
(DA Proj. 1T6-65702-D-127)
(AD-A058159; ECOM-DR-970) Avail: NTIS HC A03/MF A01 CSCL 04/2

Meteorological data gathered for the launching of 19302A GSRS, Missile Numbers V-7/V-8, Round Numbers V-7/V-8, are presented in tabular form. Author (GRA)

N79-12660# Naval Postgraduate School, Monterey, Calif.
THE AIRBORNE RESEARCH DATA SYSTEM (ARDS): DESCRIPTION AND AN EVALUATION OF METEOROLOGICAL DATA RECORDED DURING SELECTED 1977 ANTARCTIC FLIGHTS Technical Report, Mar. - May 1978
Robert J. Renard and Michael S. Foster May 1978 91 p
(Grant NSF DDP-76-00437)
(AD-A057996; NPS-63-78-002) Avail: NTIS HC A05/MF A01 CSCL 05/2

The paper describes the Airborne Research Data System (ARDS) and presents an evaluation of meteorological data recorded by it while installed aboard a United States Navy LC130R aircraft flown by the Antarctic Development Squadron Six (VXE-6), in support of the National Science Foundation's research programs in Antarctica. The evaluation consists of a comparison of wind, temperature and moisture data, collected on four flight missions with similar data from Antarctic and New Zealand rawinsonde observations, as well as 50 kPa analyses. The results demonstrate some of the capabilities and limitations of the ARDS in logging meteorological data for operational as well as scientific research. Recommendations for improving the credibility of the sensed parameter data are included. GRA

N79-12661# Army Electronics Command, White Sands Missile Range, N. Mex. Atmospheric Sciences Lab.
THE 19302A GSRS, MISSILE NUMBER V-9, ROUND V-9 (20 APRIL 1978) Meteorological Data Report
May 1978 21 p
(DA Proj. 1T6-65702-D-127)
(AD-A058233; ECOM-DR-971) Avail: NTIS HC A02/MF A01 CSCL 04/2

Meteorological data gathered for the launching of 19302A GSRS, Missile No. V-9, Round No. V-9, are presented in tabular form. Author (GRA)

N79-12662# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
THE 17901A HONEST JOHN, MISSILE NUMBERS 197 (AD), 217 (AK), AND 241 (BC), ROUND NUMBERS UNKNOWN (23 MAY 1978) Meteorological Data Report
Jun. 1978 36 p
(DA Proj. 1T6-65702-D-127)
(AD-A058234; ECOM-DR-972) Avail: NTIS HC A03/MF A01 CSCL 04/2

Meteorological data gathered for the launching of 17901A Honest John, Missile Numbers 197 (AD), 217 (AK) and 241 (BC), Round Numbers Unknown, are presented in tabular form. Author (GRA)

N79-12663# Naval Research Lab., Washington, D. C.
THE MODIFIED CANADIAN SPECTRAL FOREST MODEL: DISCUSSION AND DOCUMENTATION Interim Report, Jul. 1976 - Dec. 1977
Walter W. Jones, Rangarao V. Madala, and Mark R. Schoeberl Mar. 1978 195 p refs
(WF52551713)
(AD-A058244; AD-E000193; NRL-MR-3698) Avail: NTIS HC A09/MF A01 CSCL 04/2

The Canadian spectral forecast model developed by Daley, et al., (1976) has been modified for use in medium range forecasts. These modifications involve primarily the vertical differencing scheme (which is changed to conserve energy), the dry convective adjustment, and some of the program structure which allows the model to run efficiently. Results of a medium range integration are compared using both the modified and original model and actual weather observation. GRA

N79-12664# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO), PATRICK AFB, COCOA BEACH, FLORIDA Final Report
21 Sep. 1977 431 p
(AD-A059159; USAFETAC/DS-78/002) Avail: NTIS HC A19/MF A01 CSCL 04/2

This six-part statistical summary of surface weather observations for Patrick AFB, Cocoa Beach, Florida contains the following parts: (A) Weather Conditions and Atmospheric Phenomena; (B) Precipitation, Snowfall and Snow depth; (C) Surface winds; (D) Ceiling versus visibility; Sky cover; (E) Daily Temperature: Maximum, Minimum and Mean; Extreme Temperature: Maximum and Minimum Psychrometric Summary of dry-bulb versus wet-bulb temperature; Mean and Standard Deviations of Temperatures: Dry bulb, Wet bulb and Dew point; Relative Humidity; (F) Station (atmospheric) pressure; Sea level pressure. Data in this report are presented in tabular form; in most cases in percentage frequency of occurrence or cumulative percentage frequency of occurrence tables. Author (GRA)

N79-12665# Alaska Univ., College. Geophysical Inst.
STUDY OF THE SUBARCTIC HEAT ISLAND AT FAIRBANKS, ALASKA Final Report, Aug. 1974 -Apr. 1978
S. A. Bowling and C. S. Benson Jun. 1978 168 p refs (Grant EPA-80299)
(PB-284099/9; EPA-600/4-78-027) Avail: NTIS HC A08/MF A01 CSCL 04B

The heat island associated with the City of Fairbanks, Alaska was studied as a means of isolating the effects of self-heating modified radiative transfer from other causes of heat islands. Minimal winter insolation virtually eliminated the effects of variable albedo and the daily temperature cycle; snow cover and dormant vegetation made differences in evapotranspiration unimportant, and very low wind speeds minimized the effect of surface roughness. The observed steady-state heat island under clear skies and low wind speeds was around 10C, with transient values reaching 14C. GRA

N79-12666# National Hurricane Center, Coral Gables, Fla.
ATLANTIC TROPICAL CYCLONE TRACKS BY 5-, 10-, 15-, AND 30-DAY PERIODS
Brian R. Jarvinen and Charles J. Neumann May 1978 62 p refs
(PB-284009/8; NOAA-TM-NWS-NHC-5) Avail: NTIS HC A04/MF A01 CSCL 04B

A revision of Atlantic tropical cyclone climatology identifies 761 storms which have reached at least tropical storm intensity over the 92 years from 1886 through 1977. Computer plots of these storm tracks for various intraseasonal periods ranging from 5 days to 1 month are presented. A brief assessment on the accuracy of the tracks is also included. GRA

N79-12667# National Severe Storms Lab., Norman, Okla.
SPRING PROGRAM SUMMARY (1977)
Peter S. Ray and John Weaver Dec. 1977 184 p
(PB-284953/7; NOAA-TM-ERL-NSSL-84; NOAA-78062810) Avail: NTIS HC A09/MF A01 CSCL 04B

Meteorological data collected from 1 April through 12 June 1977 are presented. The major portion of the data is daily operational summaries. Doppler Radar Characteristics are tabulated in Appendix A. The quality control summary is Appendix B and the lightning mapping collection modes is Appendix C. Appendices D-F list the location of the remote surface site facilities and Appendices G-J list the Doppler radar collection modes. GRA

N79-12668# National Weather Service, Salt Lake City, Utah. Western Region.
FLASH FLOOD FORECASTING AND WARNING PROGRAM IN THE WESTERN REGION
Phillip Williams, Jr. and Chester L. Glenn Mar. 1978 17 p refs
(PB-285266/3; NOAA-TM-NWS-WR-82-Rev; NOAA-78071211) Avail: NTIS HC A02/MF A01 CSCL 04B

Warning of flash floods is largely an observational problem. Potential for occurrence of heavy rains can be forecast by synoptic means and used as a basis for a flash flood watch, but specific areas where excessive rains will fall cannot be realistically predicted in most cases and must be determined using radar, satellite data, and reports by witnesses. Program emphasis must be placed upon areas in which people and removable property can be protected by such service. The National Weather Service (NWS) has a well-organized program for issuing watches and warnings and distributing them through the public dissemination media. This program consists of three types of issuances--alerts, watches, and warnings. GRA

N79-12669# National Oceanic and Atmospheric Administration, Washington, D. C. Federal Coordinator for Meteorological Services and Supporting Research.
THE FEDERAL PLAN FOR METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH, FISCAL YEAR 1979
Richard E. Hallgren Jul. 1978 48 p
(PB-285647/4; NOAA-78072102) Avail: NTIS HC A03/MF A01 CSCL 04B

Federal meteorological programs designed to reduce the economic and social impact of natural disasters, promote the nation's welfare and economy, preserve and enhance the environment, and strengthen the national security are described. A list of specialized plans is summarized in the publications section. Fiscal data are summarized. The basic and specialized meteorological services are presented from an operational point of view along with the supporting research aimed at improving the individual services. GRA

N79-12670# National Hurricane and Experimental Meteorology Lab., Coral Gables, Fla.
THE DISTRIBUTION OF TURBULENT KINETIC ENERGY DISSIPATION IN HURRICANES OVER A LIMITED RANGE OF WIND SPEEDS
Francis J. Merceret Jul. 1978 20 p refs
(PB-285722/5; NOAA-TM-ERL-NHEML-1; NOAA-78072004) Avail: NTIS HC A02/MF A01 CSCL 04B

The distribution of turbulent kinetic energy dissipation in three hurricanes was found to be an approximately lognormal random variable nearly independent of altitude (below 650 m) and distance from storm center for wind speeds from 20 to 30 m/s. GRA

N79-12671# National Hurricane Center, Coral Gables, Fla.
A TROPICAL CYCLONE DATA TAPE FOR THE NORTH ATLANTIC BASIN, 1886-1977: CONTENTS, LIMITATIONS, AND USES
Brian R. Jarvinen and Eduardo L. Caso Jun. 1978 28 p refs
(PB-285504/7; NOAA-TM-NWS-NHC-6; NOAA-78071315) Avail: NTIS HC A03/MF A01 CSCL 04B

The National Hurricane Center compiled a magnetic tape on North Atlantic tropical cyclones. The tape contains the dates, tracks, wind speeds, and central pressure values (if available) for all tropical cyclones occurring over the 92 year period, 1886 through 1977. The data organization, format, and limitations are discussed and several uses of the data are demonstrated. GRA

N79-12672# National Climatic Center, Asheville, N. C.
SUMMARY OF SYNOPTIC METEOROLOGICAL OBSERVATIONS (SSMO) ALASKA COASTAL MARINE AREA, VALDEZ MARINE AREA, VALDEZ, CAPE HINCHINBROOK
Jun. 1978 168 p
(PB-285697/9; NOAA-78072504) Avail: NTIS HC A08/MF A01 CSCL 04B

Data for Valdez and Cape Hinchinbrook were edited and keyed to magnetic tape for a ten year period: Valdez hourly observations varied from 0800-1600 LST to 0500-2000 LST for the period July 1967-June 1977; Cape Hinchinbrook observations were three hourly observations from 0100-1900 LST (excluding 1600 LST) for the period July 1964-June 1974. The marine area is defined 59 degrees N to Alaska's coast, 144-149 degrees W. The marine data contain weather observations taken aboard vessels of varying registry over the period 1929-1977. An automated/visual quality control of the marine data was made, and where possible, missing psychrometric data were computed. GRA

N79-12673# National Climatic Center, Asheville, N. C.
COMPARATIVE CLIMATIC DATA THROUGH 1977
Alva L. Wallis, Jr. May 1978 103 p
(PB-285563/3; NOAA-78071210) Avail: NTIS HC A06/MF A01 CSCL 04B

Tables of meteorological elements outline the climatic conditions at approximately 300 locations across the United States. Of the 90 major urban areas which reported populations greater than 150,000 in the 1970 census, 79 are listed by name. Data are presented for weather stations within 30 miles of the 11 urban areas not listed. The listed weather observing stations are distributed in all 50 states from Barrow, Alaska, to Key West, Florida; and from Lihue, Hawaii, to Caribou, Maine. Information is also given for San Juan, Puerto Rico, and 12 stations in the Pacific. GRA

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N79-12674 Rhode Island Univ., Kingston.
A BAROTROPIC STEADY-STATE NUMERICAL MODEL OF THE CIRCULATION IN THE GULF OF MEXICO Ph.D. Thesis
Kenneth Arthur Mooney 1978 119 p
Avail: Univ. Microfilms Order No. 7821168

The model is driven by the inflow through the Yucatan Straits. It is able to retain the field acceleration terms in the equations of motion and also includes the effects of a variable Coriolis parameter and of topography. The resulting governing differential equation is weakly non-linear and an iterative technique is developed to solve it numerically. The resulting solutions yield streamline patterns depicting the path of the Loop Current through the Gulf of Mexico. The model indicates that the depth of penetration of the Loop Current into the eastern Gulf of Mexico is controlled by the magnitude of the lateral shear in the inlet velocity profile across the Yucatan Straits. There is good agreement between the observed circulation patterns and those generated from the model. Dissert. Abstr.

N79-12675 Rhode Island Univ., Kingston.
MELTING RELATIONS AND MINERAL CHEMISTRY OF ICELAND AND REYKJANES RIDGE BASALTS Ph.D. Thesis
Martin Robert Fisk 1978 274 p
Avail: Univ. Microfilms Order No. 7820583

Iceland and Reykjanes Ridge basalts were melted and recrystallized in a furnace with the oxygen pressure kept near the quartz-fayalite-magnetite buffer with a gas mixture of CO2 and H2 at atmospheric pressure. Minerals from the melted and recrystallized rock powders were compared to phenocrysts found in the rocks. Most olivine phenocrysts appear to have equilibrated with their host rock near the one atmosphere liquidus temperature. Plagioclase phenocrysts of two distinct compositions are often present in the basalts and may represent two stages of plagioclase crystallization. Plagioclase compositions from the experimental runs are most like the low anorthite phenocrysts in the rock. Spinel from the rocks and the experimental runs were compared and indicate spinel crystallized in the basalts near 1200 C. Temperature profiles along the Mid-Atlantic Ridge based on olivine and plagioclase phenocryst/glass geothermometers are parallel to the experimentally determined liquidus temperature profile. Dissert. Abstr.

N79-12676 Washington Univ., Seattle.
THE PROCESS OF DETRITAL SEDIMENT ACCUMULATION IN A CONTINENTAL SHELF ENVIRONMENT: AN EXAMINATION OF THE WASHINGTON SHELF Ph.D. Thesis
Charles Albert Nittrouer 1978 257 p
Avail: Univ. Microfilms Order No. 7820756

Lead-210 geochronology was used to establish budgets for the sediments transported by the Columbia River northward across the Washington continental shelf over the period for which environmental conditions have been documented (about a century). These observations of sediment mixing and accumulation agreed with and complemented studies of sedimentary structures, shelf hydrodynamics, benthic biology, sediment texture and composition, and Holocene stratigraphy. The most rapid accumulation of modern sediment on the Washington shelf occurs near the mouth of the Columbia (within 20 km). This region is characterized near-shore by the accumulation of bedded sand, and further off-shore by intensely mottled sand and mud. The most rapid accumulation of modern sediment on the shelf north of the Columbia occurs in the mid-shelf region where accumulation is characterized by a mottled deposit of silt with some sand. Dissert. Abstr.

N79-12677 Hawaii Univ., Honolulu.
MARINE SEDIMENTATION AND MANGANESE NODULE FORMATION IN THE SOUTHWESTERN PACIFIC OCEAN Ph.D. Thesis
Maurice Andre Meylan 1978 325 p
Avail: Univ. Microfilms Order No. 7820431

An extensive field of iron-rich, nickel- and copper-poor manganese nodules covers the deep sea-floor of the northeastern quadrant of the Southwestern Pacific Basin, and the eastern side of the Samoan Basin. The nodules occur almost exclusively on medium to dark brown silty clays which contain a significant proportion (5-15%) of red-brown semi-opaque oxides. The brown silty clays consist principally of phyllosilicates (illite, montmorillonite, chlorite and kaolinite) plus subsidiary quartz and feldspar. Microfossils are generally rare, but all of the brown silty clays contain trace quantities of calcareous nannofossils. On the basis of nodule morphology, internal structure and composition, two nodule facies can be recognized in the area-the Cook Island Facies and the Southwestern Pacific Basin Facies. Dissert. Abstr.

N79-12678*# Applied Science Associates, Inc., Apex, N. C.
AN INVESTIGATION OF THE OBSERVABILITY OF OCEAN-SURFACE PARAMETERS USING GEOS-3 BACKSCATTER DATA Final Report
L. S. Miller and R. W. Priester Oct. 1978 117 p refs
(Contract NAS6-2621)
(NASA-CR-156846) Avail: NTIS HC A06/MF A01 CSCL 08C

The degree to which ocean surface roughness can be synoptically observed through use of the information extracted from the GEOS-3 backscattered waveform data was evaluated. Algorithms are given for use in estimating the radar sensed waveheight distribution or ocean-surface impulse response. Other factors discussed include comparisons between theoretical and experimental radar cross section values, sea state bias effects, spatial variability of significant waveheight data, and sensor-related considerations. S.B.S.

N79-12679*# North Carolina State Univ., Raleigh. Dept. of Geosciences.
OCEANIC GEOID AND TIDES OBTAINED FROM GEOS-3 SATELLITE DATA IN THE NORTHWESTERN ATLANTIC OCEAN
I. J. Won and L. S. Miller Oct. 1978 26 p refs Prepared in cooperation with Appl. Sci. Assoc., Inc., Apex, N. C.
(Contract NAS6-2810)
(NASA-CR-156845) Avail: NTIS HC A03/MF A01 CSCL 08C

Two sets of GEO-3 altimeter data which fall within about a 2.5 degree width are analyzed for ocean geoid and tides. One set covers a linear path from Newfoundland to Cuba and the other from Puerto Rico to the North Carolina coast. Forty different analyses using various parameters are performed in order to investigate convergence. Profiles of the geoid and four tides, M sub 2 O sub 1, S sub 2, and K sub 1, are obtained along the two strips. The results demonstrate convergent solutions for all forty cases and show, within expectation, fair agreement with those obtained from the MODE deep-sea tide gauge. It is also shown that the oceanic geoid obtained through this analysis can potentially improve the short wavelength structure over existing geoid models. Author

N79-12680# Alpine Geophysical Associates, Inc., Norwood, N. J.
ACOUSTIC AND GEOPHYSICAL SURVEY OF BOTTOM AND SUB-BOTTOM REFLECTION LOSS AREA A, PART 1 Final Report
William T. McGuinness and Charles B. Officer 1978 61 p refs
(Contract N62306-1442)
(AD-A059101) Avail: NTIS HC A04/MF A01 CSCL 20/1

The survey and interpretation of survey results consisted of a detailed acoustic and geophysical program to investigate bottom and sub-bottom reflection loss characteristics in a 1-degree square of the Atlantic Ocean known as Area A. Area A is bounded by latitudes 36 deg to 37 deg N and longitudes 66 degree to 67 degree W. The survey was performed from the U.S. Navy ships San Pablo and Sheldrake during April and May, 1964. The resulting acoustic and geophysical data were analyzed and interpreted during the following three months. GRA

N79-12487# Continental Shelf Inst., Trondheim (Norway).
FUTURE EUROPEAN CONTRIBUTIONS TO SPACE TECHNOLOGY AND THE EXPLORATION OF THE NORWEGIAN CONTINENTAL SHELF
Jan C. Blankenburgh *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 99-105 refs (For primary document

see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N79-12681 Wisconsin Univ. - Madison.
METABOLIC RESPONSES OF PONIES TO TREADMILL EXERCISE IN HYPEROXIA Ph.D. Thesis
Karen Ann Stanek 1978 116 p
Avail: Univ. Microfilms Order No. 7815434

The true oxygen consumption (VO2) of the pony in exercise in hyperoxic conditions is determined. These studies were performed on seven ponies at rest and during treadmill exercise under two conditions, normoxia and a 60% O2 - 40% N2 mixture (hyperoxia). During the exercise the ponies trotted on a treadmill at 5mph (115m/min.), 10% grade for ten minutes. Anaerobic blood samples were obtained from the pulmonary artery and aorta during the 10th minute of exercise. Simultaneous collections of the expired gases were also made. Cardiac output (C.O.) was determined by the dye dilution technique. Blood gas contents were determined by the Van Slyke method and the inspired and expired gas fractions were measured on a micro-Scholander analyzer. Dissert. Abstr.

N79-12682 Vanderbilt Univ., Nashville, Tenn.
CARDIOVASCULAR STUDIES OF REDUCING AND OXIDIZING AGENTS Ph.D. Thesis
Richard Dean Olson 1978 150 p
Avail: Univ. Microfilms Order No. 7823464

Hydrogen peroxide (H2O2) in 5% glucose infused at the aortic valve attenuated the precipitous fall in mean blood pressure and heart rate and significantly increased survival time (time from beginning of occlusion to zero pulse pressure) following left main coronary artery occlusion in rabbits. The beneficial effect of H2O2 in 5% glucose on the hemodynamic parameters following occlusion was dependent on the infusion site. Infusion of hydrogen peroxide in 5% glucose in the aortic arch, descending aorta, and jugular vein was less efficacious in attenuating the changes in hemodynamic parameters following left main coronary artery occlusion than infusion at the aortic valve. The main action of hydrogen peroxide in 5% glucose was on the heart and not in the peripheral, carotid, or cerebral circulation. Dissert. Abstr.

N79-12683 Hahnemann Medical Coll. and Hospital, Philadelphia, Pa.
THE EFFECT OF MODERATE HYPOTHERMIA ON THE CIRCULATORY AND MYOCARDIAL CONSEQUENCES OF ACUTE CORONARY LIGATION IN DOGS Ph.D. Thesis
Steven R. Bergmann 1978 295 p
Avail: Univ. Microfilms Order No. 7822684

Male mongrel dogs were anesthetized with pentobarital, and underwent thoracotomy and dissection of the proximal left anterior descending coronary artery. Thirty minutes after ligation of the artery, dogs were randomized into one of two groups. Fifteen dogs were maintained at normothermic levels for 9 hours after ligation and 14 dogs were surface-cooled to 27 C, maintained at this temperature for two hours, rewarmed to normothermic levels, and observed for an additional hour. Various myocardial and circulatory measurements were made. Just prior to sacrifice, lissamine green was injected intracardially to delineate perfused versus non-perfused myocardium. Non-perfused sections were further incubated in Nitro-BT for the detection of dehydrogenase activity. Dissert. Abstr.

N79-12684*# National Aeronautics and Space Administration, Washington, D. C.
ROLE OF GRAVITY IN EARLY DEVELOPMENT
Nov. 1978 74 p refs Transl. into ENGLISH from the book "Problemy Biologii Razvitiya. Vneshnaya Sreda i Razvyvayushiysya Organizm" Moscow, Nauka Press, 1977 p 140-173 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-75590) Avail: NTIS HC A04/MF A01 CSCL 06C

Centrifuging and clinostat experiments designed to determine the effect of gravity on the development of embryos are reviewed. It appears that the effect of zero gravity on development is negligible. G.G.

N79-12685*# National Aeronautics and Space Administration, Washington, D. C.
THE ORGANISM AND THE HABITATION ATMOSPHERE
N. A. Agadzhanyan Aug. 1978 250 p refs Transl. into ENGLISH of the book "Organizmi Gazovaya Sreda Obitaniya", Moscow, Meditsina Press, 1972 p 1-248 Transl. by Linguistics Systems Inc., Cambridge, Mass.
(Contract NASw-2482)
(NASA-TM-75536) Avail: NTIS HC A11/MF A01 CSCL 06C

Experimental data is examined on the study of the influence of the different parameters of the atmosphere on the organism for the purpose of making a physiological determination of the permissible oxygen concentrations in inhabited airtight compartments. The application of high oxygen concentrations for respiration and for medical purposes are considered. Data is presented on the evolution of the atmosphere and of the role of O2 in the process of the evolutionary development of living beings; the influence of an organism of an artificial, high and low oxygen concentration atmospheres; the laws of oxygen permeation into fluid media of the organism; the biological role of inert gases; etc. The relationship between the gas medium of habitation and reactivity of the organism is determined. G.Y.

N79-12686# California Univ., Riverside. Statewide Air Pollution Research Center.
THE IMPACT OF SULFUR DIOXIDE ON VEGETATION: A SULFUR DIOXIDE-OZONE RESPONSE MODEL Final Report
R. J. Oshima 15 Mar. 1978 94 p refs Sponsored by Air Resources Board, Sacramento, Calif.
(PB-283604/7; ARB-R-A6-162-30-78-79;
Rept-5-111200-20832-0) Avail: NTIS HC A05/MF A01 CSCL 02D

The effect of oxidant alone and in combination with 10 pphm sulfur dioxide upon the kidney bean was determined. Red kidney beans were grown in exposure chambers with 0%, 25%, 50%, 75% and 100% carbon filtered air alone and in combination with 10 pphm SO2. Additionally, 2 ambient plots were utilized. An interaction with ozone and SO2 was documented in the 50% carbon filtered treatment and produced a significant reduction in yield and plant biomass. No reductions in yield or plant biomass were detected on red kidney beans exposed in equivalent doses of ambient ozone alone. Ambient ozone alone produced significant reduction in yield only at doses exceeding 5144 pphm-hrs. GRA

52 AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation; and weightlessness.

N79-12687 California Univ., Riverside.
THE EFFECTS OF OZONE ON HUMAN ERYTHROCYTES AND PHOSPHOLIPID VESICLES Ph.D. Thesis
Bruce Alan Freeman 1978 122 p
Avail: Univ. Microfilms Order No. 7821347

Ozone is the major oxidant in photochemical air pollution. This gas is extremely toxic to lung cells and is seen to affect circulating erythrocytes. Phospholipid vesicles and liposomes made from egg phosphatidylcholine reacted similarly with ozone, producing hydrogen peroxide and malonaldehyde via an ozonolysis mechanism. The reactivity of the egg phosphatidylcholine membranes was a function of exposed membrane surface area. Erythrocyte osmotic fragility decreased after low dosages of ozone and increased after higher dosages. Large amounts of ozone caused no change in erythrocyte phospholipid, fatty acid or cholesterol composition, even though these lipids were oxidizable by ozone when not in a biological membrane. Dissert. Abstr.

N79-12688 Purdue Univ., Lafayette, Ind.
AN ILLNESS-INJURY SEVERITY INDEX Ph.D. Thesis
David Lowell Bever 1978 107 p

Avail: Univ. Microfilms Order No. 7821417

Eight easily observable diagnostic criteria were identified to enable nonphysician emergency personnel to evaluate a patient's major body systems. Rating scales were developed for each of the criteria. When each of the criteria had been measured, the eight severity scores were summed to yield an estimate of overall patient condition. A maximum conditional relative frequency principle was used to develop scales for determining the accuracy of the in evaluating the severity of patient condition. Prediction scales developed from the data show that the Index correctly identified the level of severity of 64 percent of the illness patients, 65 percent of the injury patients, and 50 percent of the patients when illness and injury scores were combined. The instrument tended to be less accurate in identifying patients with non-life-threatening emergencies, while it was highly accurate in identifying patients with life-threatening emergency problems.Dissert. Abstr.

N79-12689 Toledo Univ., Ohio.
CARBOHYDRATE METABOLISM OF THE STIMULATED DIAPHRAGM MUSCLE Ph.D. Thesis
Raymond Nadon 1978 116 p
Avail: Univ. Microfilms Order No. 7824528

An in vitro diaphragm preparation was used for studying carbohydrate metabolism of contracting muscle tissue. The diaphragm muscle from 150-200 gram male rats, fed ad libitum, was used. ASD-5 Grass polygraph and stimulator were used to record the amplitude of contraction and to stimulate the muscle respectively. The nonstimulated and stimulated muscle preparations were incubated at 37% C in vertical tubes containing approximately 8 ml of Gey and Gey incubation medium saturated with 95% O2-5%Co2. Glucose was varied from 0 to 2.5 mg/ml. When the muscle was stimulated in the absence of glucose, the amplitude of contraction decreased constantly with time. There was significantly less reduction in the amplitude of contraction when glucose was included at 1 mg/ml, but was not further affected when glucose was increased to 2.5 mg/ml. In the medium without glucose, glycogen was only half depleted when the muscle became fatigued. When glucose was included at 2.5 mg/ml, the muscle was fatiguing even though there was a sparing of glycogen; this preferential utilization of glucose occurred without the presence of added insulin.
Dissert. Abstr.

N79-12690 Utah Univ., Salt Lake City.
CLINICAL COMPARISONS OF PRESSURE PULSE AND INDICATOR DILUTION METHODS OF DETERMINING CARDIAC OUTPUT Ph.D. Thesis
Robert Milton Cundick, Jr. 1978 186 p
Avail: Univ. Microfilms Order No. 7822823

The Warner pressure pulse method to calculate cardiac output is compared with dye and thermodilution cardiac output measurement techniques. A clinical study comparing both the Warner and Bourgeois pressure pulse methods with thermodilution is also included. Results of the correlations are presented with correlation coefficients. The data presented show that use of the Warner and Bourgeois pressure pulse methods in their present forms for monitoring the cardiac output of critically-ill patients with widely varying mean arterial pressures does not provide data of sufficient reliability for use in clinical decisions on patient management. Dissert. Abstr.

N79-12691 Marquette Univ., Milwaukee, Wis.
DENSITY DEPENDENCE OF MAXIMUM EXPIRATORY FLOW Ph.D. Thesis
Ricardo Javier Soto 1978 186 p
Avail: Univ. Microfilms Order No. 7824345

A mathematical model of pulmonary fluid mechanics was used to gain increased understanding of the influence of changes in pulmonary mechanics on maximum expiratory flow (MEF). MEF was simulated as a succession of steady flows (quasi-steady flow) which are dependent on the instantaneous pressure based distribution and airway lengths and diameters at any lung volume. The mechanical energy balance and diameter versus trans-mural pressure relations for each generation were solved numerically. Model simulations were used to assist in interpretation of results. MEF versus volume (MEFV) curves were obtained on anesthetized, intact, tracheotomized dogs, breathing air, 80:20% helium-oxygen and 80:20% SF6O2 mixtures. Thoracic gas flow and volume were measured. Functional residual capacity, recoil pressure, tracheal pressure and pleural pressure were also measured. Dissert. Abstr.

N79-12692 California Univ., Santa Barbara.
MODELING OF VISUAL-VESTIBULAR INTERACTION AND THE FAST COMPONENTS OF NYSTAGMUS Ph.D. Thesis
Clifford Gee Yau Lau 1978 190 p
Avail: Univ. Microfilms Order No. 7824181

During head rotation in the light, both the vestibular and the optokinetic systems are stimulated. The eye movement response is the result of the combined responses of both systems. An engineering model is proposed for the evaluation of these eye movement responses during simultaneous optokinetic and vestibular stimulation. The main hypothesis is that there is a linear summation of the visual signal and the vestibular signal during visual-vestibular interaction tests. The model accounts for the dominance of the visual system at low frequencies and the dominance of the vestibular system at high frequencies. The model also accounts for a large number of observations concerning the effect of vision on vestibular nystagmus, and accounts for the inability of subjects with impaired smooth pursuit to suppress the vestibular nystagmus. The existence of a threshold for the production of the fast components of nystagmus has been demonstrated in the rabbit for all types of physiological nystagmus reactions. Dissert. Abstr.

N79-12693 Stanford Univ., Calif.
A DIRECTIONAL PULSED-DOPPLER ULTRASONIC BLOOD FLOWMETER Ph.D. Thesis
Wayne Carr Haase 1978 141 p
Avail: Univ. Microfilms Order No. 7822511

A type of directional pulsed Doppler ultrasonic blood flowmeter was developed and used percutaneously to measure canine blood flow and intraoperatively to measure human and canine blood flow. The unit utilizes an offset frequency technique to measure flow direction and realizes a ratiometric measurement of the velocity profile across a blood vessel. The system offers the following advantages over conventional flowmeters: (1) it is calibrated and drift free, requiring no user calibration of the baseline (flow zero) or scale factor, (2) affords greater accuracy in the measurement of low velocities, and (3) is of significant value when a large forward flow is accompanied by a small reverse flow, as in the ascending aorta. An optimization procedure was developed to determine the various system parameters based on physiological factors to maximize flowmeter resolution.
Dissert. Abstr.

N79-12694* National Aeronautics and Space Administration. Pasadena Office, Calif.
AUTOMATED CLINICAL SYSTEM FOR CHROMOSOME ANALYSIS Patent
Kenneth R. Castleman (JPL), Howard J. Friedan (JPL), Elbert T. Johnson (JPL), Paul A. Rennie (JPL), and Raymond J. Wall, inventors (to NASA) (JPL) Issued 24 Oct. 1978 141 p Filed 17 May 1976 Supersedes N77-19750 (15 - 10, p 1357) Sponsored by NASA
(NASA-Case-NPO-13913-1; US-Patent-4,122,518; US-Patent-Appl-SN-687251; US-Patent-Class-364-300; US-Patent-Class-128-2R; US-Patent-Class-364-120; US-Patent-Class-364-415; US-Patent-Class-364-900) Avail: US Patent and Trademark Office CSCL 06B

An automatic chromosome analysis system is provided wherein a suitably prepared slide with chromosome spreads thereon is placed on the stage of an automated microscope. The automated microscope stage is computer operated to move the slide to enable detection of chromosome spreads on the slide. The X and Y location of each chromosome spread that is detected is stored. The computer measures the chromosomes in a spread, classifies them by group or by type and also prepares a digital karyotype image. The computer system can also prepare a patient report summarizing the result of the analysis and listing suspected abnormalities.
Official Gasette of the U.S. Patent and Trademark Office

N79-12695*# Harding Coll., Searcy, Ark.
ISOKINETIC EXERCISE: A REVIEW OF THE LITERATURE Final Report, 1 May - 31 Oct. 1978

Harry D. Olree, Bob Corbin, and Carroll Smith 31 Oct. 1978 10 p refs
(Contract NAS9-15596)
(NASA-CR-151841) Avail: NTIS HC A02/MF A01 CSCL 06P

Isokinetic muscle training has all the advantages of isometrics and isotonics while minimizing their deficiencies. By holding the speed of movement constant throughout the full range of motion, isokinetic training devices respond with increased resistance rather than acceleration when the power output of the muscle is increased. Isokinetic training is superior to isometric and isotonic training with respect to increases in strength, specificity of training, desirable changes in motor performance tasks, lack of muscle soreness, and decreases in relative body fat. A.R.H.

N79-12696# Civil Aeromedical Inst., Oklahoma City, Okla.
THE MORBIDITY EXPERIENCE OF AIR TRAFFIC CONTROL PERSONNEL, 1967-1977
Charles F. Booze Apr. 1978 33 p refs
(AD-A056053; FAA-AM-78-21) Avail: NTIS HC A03/MF A01 CSCL 06/5

The morbidity experience of 28,086 air traffic controllers has been examined from 1967-77 with particular emphasis given the potential effects of job demands on ATC Health. The morbidity experience of air traffic controllers does not appear excessive when compared with the experience of other outside groups studied, except for psychoneurotic disorders. Additionally, a lack of association between disease occurrence and occupation is observed in the data correlating disease occurrence with length of service and age. While some isolated trends found in these data are supportive of an occupation disease relationship, they are neither impressive nor consistent, as would be expected if the association were a strong one. Although anticipated empirically one of the more interesting results of the study was quantification of the substantial differences found to exist in the incidence of disease before and after the second-career legislation. Author

N79-12697*# Pennsylvania State Univ., University Park. Department of Biochemistry and Biophysics.
PURIFICATION AND CULTIVATION OF HUMAN PITUITARY GROWTH HORMONE SECRETING CELLS Mid-term Report
W. C. Hymer 1 Nov. 1978 63 p Original contains color illustrations
(Contract NAS9-15566)
(NASA-CR-151853) Avail: NTIS HC A04/MF A01 CSCL 06M

The maintainance of actively secreting human pituitary growth hormone cells (somatotrophs) in vitro was studied. The primary approach was the testing of agents which may be expected to increase the release of the human growth hormone (hGH). A procedure for tissue procurement is described along with the methodologies used to dissociate human pituitary tissue (obtained either at autopsy or surgery) into single cell suspensions. The validity of the Biogel cell column perfusion system for studying the dynamics of GH release was developed and documented using a rat pituitary cell system. S.B.S.

N79-12698# Civil Aeromedical Inst., Oklahoma City, Okla.
REACTIONS OF METHAMIDOPHOS WITH MAMMALIAN CHOLINESTERASES
Casey P. Robinson (Oklahoma Univ., Oklahoma City), Donald Beiergrohslein (Oklahoma Univ., Oklahoma City), Paul W. Smith, and Charles R. Crane Jul. 1978 9 p refs
(AD-A058683/4; FAA-AM-78-26) Avail: NTIS HC A02/MF A01 CSCL 06/15

The Lethality of methamidophos, a phosphoramidothioate, to rats is similar to that of such potent organophosphate compounds as parathion and paraoxon. Certain distinctive features of its chemical structure, and reported failure of cholinesterase inhibited with methamidophes to reactivate spontaneously in insects, prompted this study of its reactions with mammalian cholinesterase to determine if the treatment of poisoning requires modification. Atropine (10 mg/kg) or pralidoxime (60 mg/kg) afforded significant protection against lethality from methamidophos (LD50's, 60 + or - 0.4 and 52 + or - 9 mg/kg, respectively). Partial spontaneous recovery of inhibited cholinesterase activity was observed. However, a single dose of pralidoxime, given essentially simultaneously with methamidophos, did not hasten the recovery of cholinesterase activity. G.G.

N79-12699# Rasor Associates, Inc., Sunnyvale, Calif.
NONINVASIVE ASSESSMENT OF PULMONARY HYPERTENSION USING BUBBLE ULTRASONIC RINGING (BURP) METHOD, PART 2 Annual Report, Apr. 1977 - May 1978
E. Glenn Tickner Jun. 1978 58 p refs
(Contract N01-HR-62917)
(PB-283935/5; NIH-N01-HR-62917-2A) Avail: NTIS HC A04/MF A01 CSCL 06L

The second year effort of a program to design, develop, and evaluate a device for the noninvasive measurement of pulmonary artery blood pressure utilizing a bubble ultrasonic ringing pressure (BURP) sensing technique is described. The basic approach involves injection into a peripheral vein of microbubbles of carbon dioxide, under pressure, which are encapsulated in fused sugar particles. At some critical point within the pulmonary artery the bubbles suddenly expanded into the blood stream. This sudden expansion causes the bubble to oscillate and the oscillation (ringing) frequency signal determines the pulmonary artery pressure. GRA

N79-12700# National Bureau of Standards, Washington, D. C. Consumer Sciences Div.
AROUSAL FROM SLEEP BY EMERGENCY ALARMS: IMPLICATIONS FROM THE SCIENTIFIC LITERATURE Final Report
V. J. Pezoldt and Harold P. VanCott Jun. 1978 38 p refs Sponsored by HEW
(PB-284044/5; NBSIR-78-1484(HEW)) Avail: NTIS HC A03/MF A01 CSCL 06P

A review of the sleep research and other scientific literature pertaining to the arousal of sleeping individuals by external stimuli is reported. This effort was undertaken to provide information about the characteristics of emergency alarms which will reliably awaken a sleeping population, especially nursing home residents, in the event of fire. Data are discussed as is the problem of performance following abrupt arousal. Recommendations regarding stimulus characteristics, measures of arousal and the experimental environment for future studies of arousal by emergency alarms are presented. GRA

N79-12701# SRI International Corp., Menlo Park, Calif.
ASSESSMENT OF HUMAN EXPOSURES TO ATMOSPHERIC BENZENE Final Report
Susan J. Mara and Shonh S. Lee Jun. 1978 213 p refs
(Contracts EPA-68-01-4314; EPA-68-02-2835)
(PB-284203/7; EPA-450/3-78-031) Avail: NTIS HC A10/MF A01 CSCL 06T

The environmental exposure of the U.S. population to atmospheric benzene emissions from specific sources was estimated. It was assumed that individuals residing in the vicinity of benzene sources spend 24 hours of each day in the same location. To estimate more representative exposures, a second objective was added to make rough estimates of individuals' total exposures by defining total exposure as the sum of exposures to all benzene sources, including those in nonresidential areas, within a designated period. GRA

N79-12702# Transportation Systems Center, Cambridge, Mass.
REVIEW OF CHEST DEFLECTION MEASUREMENT TECHNIQUES AND TRANSDUCERS Final Report, Sep. 1976 - May 1977
Gordon R. Plank Jun. 1978 38 p refs
(PB-283654/2; DOT-TSC-NHTSA-78-33; DOT-HS-803350) Avail: NTIS HC A03/MF A01 CSCL 13L

A summary is presented of various techniques and transducers for their potential use with dummies, cadavers, infra-human primates and living humans. Those techniques and transducers found to have high potential for use with living humans are discussed in detail. Measurement requirements are summarized, inherent problems are pointed out, and recommendations for the solution of some of these problems are given. GRA

N79-12703# Mayo Foundation, Rochester, Minn.
DEVELOPMENT OF HIGH-RESOLUTION ULTRASONIC

IMAGING TECHNIQUES FOR DETECTION AND CLINICAL ASSESSMENT OF CARDIOVASCULAR DISEASE Final Annual Report, Oct. 1976 - Oct. 1977

Titus C. Evans, Jr., Philip S. Green, and James F. Greenleaf May 1978 112 p refs Prepared in cooperation with SRI Intern., Menlo Park, Calif.

(Contract N01-HV-4-2904)

(PB-284686/3; NIH/NHLBI-N01-HV-4-2904-4) Avail: NTIS HC A06/MF A01 CSCL 06C

Ultrasound instrumentation and methods are reported for the detection and assessment of atherosclerosis in carotid and femoral arteries of living patients, thereby avoiding the pain, risk, and associated drawbacks of angiography. Preliminary comparisons of ultrasound B-scans and angiograms of carotid atherosclerotic lesions were extremely encouraging; yet, sometimes significant discrepancies in interpretation occurred. Significant improvement in the ease of using the clinical instrument, in B-scan resolution, and in the signal-to-noise ratio of the Doppler system were achieved. The potential advantages of combined B-scan and Doppler images in evaluating a given lesion were demonstrated. GRA

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N79-12704# Calspan Corp., Buffalo, N. Y.

RETENTION AND TRANSFER OF TRAINING ON A PROCEDURAL TASK INTERACTION OF TRAINING STRATEGY AND COGNITIVE STYLE Final Scientific Report, 1 Oct. 1976 - 30 Sep. 1977

Steven Lee Johnson 30 Jan. 1978 123 p refs

(Contract F49620-77-C-0019)

(AD-A058966; CALSPAN-DJ-6032-M-1; AFOSR-78-1161TR) Avail: NTIS HC A06/MF A01 CSCL 05/9

This study investigated the effectiveness of three different training strategies with respect to initial training, retention, and transfer of training. In addition to investigating the relative merits of the three strategies, the possibility of matching the instructural strategy and the trainee's cognitive style was evaluated. There is growing research support for the contention that different individuals utilize different means of encoding and/or storing information. The effect of these differences with respect to initial training, retention, and transfer of training was addressed in the context of a realistic task. The particular task used was representative of the many sequential procedures performed which range from operating master control panels in industrial plants to normal and emergency procedures in air vehicles. The results of the study indicate that: (1) vividness of imagery does interact with training strategy, (2) training devices do not need high fidelity to be effective in training procedural tasks, and (3) the use of training strategy that requires the trainee to provide his own cueing and feedback from memory is effective in increasing the retention of procedure-following skills, independent of cognitive style. These results have important implications for both the dollar cost and logistics of initial and refresher training, as well as for the retention efficiency of an important aspect of the human's present job description. GRA

N79-12705# Columbia Univ., New York. Psychophysics Lab.

APPLICATIONS OF TWO-PARAMETER DECISION THEORIES IN PSYCHOLOGY

Eugene Galanter 1 Aug. 1978 117 p refs

(Contract N00014-67-A-0108; NR Proj. 197-016)

(AD-A059010; PLR-39) Avail: NTIS HC A06/MF A01 CSCL 05/10

This report describes a general two-parameter decision theory as developed in experimental psychology as the theory of signal detectability. The report abstracts published research in seven areas in which the theory has been applied. The general theory is explicated in a technically precise, but non-quantitative form. Each of the substantive areas that contain abstracts from the literature are prefaced by introductory and explanatory remarks. Experimental and theoretical work that is critical of the decision theoretic approach within the substantive areas are included among the abstracts. Sufficient technical information and tabular material is contained to make it possible for the non-specialist to calculate the decision theoretic statistics from appropriately collected data. Author (GRA)

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N79-12706# Technology, Inc., San Antonio, Tex. Life Sciences Div.

ENGINEERING TEST AND EVALUATION DURING HIGH G. VOLUME 3: ANTI-G SUITS Final Report, 1 Feb. 1975 - 30 Sep. 1976

Roy W. Thompson, Larry J. Meeker, Gary I. Wilson, Arnold G. Krueger, and Paul E. Love Jun. 1978 155 p refs

(Contract F41609-75-C-0026; AF Proj. 7930)

(AD-A059122; SAM-TR-78-12-Vol-3) Avail: NTIS HC A08/MF A01 CSCL 06/17

In this final volume of a three-volume study report, a protocol for testing anti-G suits is described and the test results from 6 test items are reported. These items are: 3 inservice units from USAF and USN; an RAF unit; and 2 experimental units (lower body full pressure, and capstan). The study of the capstan suit is extended to investigate the man-suit interface. Field-test protocols for anti-G suits and anti-G valves are also proposed. Author (GRA)

N79-12707# Science Applications, Inc., Englewood, Colo.

A CRITALLY ANNOTATED BIBLIOGRAPHY OF THE LITERATURE ON HUMAN FACTORS IN COMPUTER SYSTEMS Final Report, 1 Jun. 1976 - 31 May 1978

H. Rudy Ramsey, Michael E. Atwood, and Priscilla J. Kirshbaum 31 May 1978 402 p

(Contract N00014-76-C-0866)

(AD-A058081; SAI-78-070-DEN) Avail: NTIS HC A18/MF A01 CSCL 05/8

A very broad survey of the literature dealing with human factors in computer systems was performed. Included in the survey were books, journal articles, proceedings papers and institutional publications from the literatures of psychology, human factors, and computer science. From the resulting list, 564 references were selected for inclusion in this bibliography. The references selected deal primarily with the human factors aspects of interactive computer systems, including hardware, software and procedures. The selection of references emphasizes experimental studies, but the bibliography also includes relevant descriptions of dialogue techniques, user requirements analysis methods, guidelines, and a variety of other relevant topics. For each reference, a citation is provided, including sufficient information to allow the reader to obtain a copy, together with a descriptive abstract and a critical annotation. An extensive subject index, as well as an author index and browsing aids, allow the users to locate those articles in which they are interested. GRA

N79-12708# Army Electronics Command, Fort Monmouth, N. J. Electronics Technology/Devices Lab.

THE EFFECT OF ACTIVE AREA ON THE LEGIBILITY OF DOT MATRIX DISPLAYS

Isidore H. Stein Jun. 1978 17 p refs

(AD-A058014; DELET-TR-78-11) Avail: NTIS HC A02/MF A01 CSCL 14/2

The dependence of legibility on active area for dot matrix displays was studied in an experimental program with human subjects. Under normal conditions, such dependence appears to be minimal. Under stressed conditions, there is a threshold at the 30 percent active area region, above which dependence again appears to be minimal. Author (GRA)

N79-12709# Army Aeromedical Research Lab., Fort Rucker, Ala.

AN EVALUATION OF PERCEPTUAL-MOTOR WORKLOAD DURING A HELICOPTER HOVER MANEUVER Final Report

Michael G. Sanders, Raymond T. Burden, Jr., R. R. Simmons, M. A. Lees, and K. A. Kimball May 1978 23 p refs
(AD-A058016; USAARL-78-14) Avail: NTIS HC A02/MF A01 CSCL 01/2

Stability augmentation systems are purported to reduce pilot workload during hover, nap-of-the-earth, and IFR maneuvers. The current research project examines a method of aiding the MEDEVAC pilot in performing a hover maneuver while perhaps reducing workload. A modular, four-axes stability augmentation system (Ministab) with integrated rate attitude and heading retention was installed on the USAARL JUH-1H helicopter. Participating personnel for the project were nine US Army aviators with a total average of 1172 flight hours. The aviators hovered at 30 feet above ground level for five minutes under each of the three following flight control conditions: unaided-normal hover with visual flight rules conditions, using Force Trim, and using the Ministab. Continuous information from twenty pilot and aircraft monitoring points was recorded on an incremental digital recorder for all flights. Multivariate analyses were performed on both aircraft status variables and control input workload/activity measures. Under the conditions tested, the stability augmentation system evaluated did not provide a clearcut improvement in flight performance and workload across all flight parameters. Author (GRA)

N79-12710# School of Aerospace Medicine, Brooks AFB, Tex.
HUMAN COMPATIBILITY TESTING OF A 2-MAN MOLECULAR SIEVE OXYGEN GENERATOR Interim Report, 1 Oct. - 31 Dec. 1977

Roger L. Stork, Clarence F. Theis, Kenneth G. Ikels, and Richard L. Miller May 1978 23 p refs
(AD-A058248; SAM-TR-78-18) Avail: NTIS HC A02/MF A01 CSCL 06/11

This report describes a series of human compatibility tests conducted to man-rate a 2-man molecular sieve oxygen generating system prior to aircraft flight test in the U.S. Navy EA-6B aircraft. The protocol included ground-level evaluations and chamber flights up to 13.4 km (44,000 ft.) altitude, simulating the operating envelope of the EA-6B. It was concluded that the molecular sieve generating unit provided adequate oxygen under all anticipated flight conditions. It was recommended, however, that the flight test program incorporate an improved oxygen regulator to enhance system performance. Author (GRA)

N79-12711# Naval Air Test Center, Patuxent River, Md.
AIRCREW PERSONNEL RESTRAINT SUBSYSTEMS DEFINITION OF DEFICIENCIES AND REQUIREMENTS Final Report

R. Bason and J. Etaeredge 24 Aug. 1978 216 p refs
(AD-A058995; NATC-SY-28R-78) Avail: NTIS HC A10/MF A01 CSCL 01/3

NAVAIRTESTCEN was tasked to examine reported problems with aircrew torso restraint garments. Five sources of information were used for the investigation into the reported problems: Development of a logic tree for analysis of reported inadequate restraint of aircrews; examination of Medical Officer's Reports from 1969 through 1976 pertaining to ejections from aircraft in which the MA-2 Integrated Torso Harness was a part of the restraint system; examination of Unsatisfactory Reports for the same period; solicitation of an Aircrew Personnel Restraint Questionnaire from aircrew assigned to high performance tactical aircraft; and a laboratory study of the biomechanics of -Gz restraint. The MA-2 Integrated Torso Harness was found to be inadequate in all respects for -Gz restraint and ineffective as a restraint garment for -Gx and lateral (Gy) accelerative forces. Data were developed defining the effects of negative Gz upon the body, suggesting that it produces two separate components, off-seat travel and body stretch, each of which requires specific treatment by any proposed restraint system. Recommendations are made for immediate improvement of deficiencies in the design of the restraint harness and its related subsystems, and emphasis is placed on the need for reevaluation of restraint needs, mobility needs, and the comfort of the crewmember in future design efforts. Further research, development, and testing of a variety of harnesses is urged. Author (GRA)

N79-12712# Naval Weapons Center, China Lake, Calif.
SAFETY EVALUATION TESTS OF PERSONAL PROTECTIVE EQUIPMENT FOR ORDNANCE OPERATIONS

Glenn C. Pritchard Aug. 1978 43 p
(AD-A058987; NWC-TP-6008) Avail: NTIS HC A03/MF A01 CSCL 19/1

This report presents and summarizes the results of tests conducted at the Naval Weapons Center to study the effectiveness of personal protective equipment used in operations involving propellants, explosives, pyrotechnics, and other high-energy materials. Criteria used to evaluate the equipment and the limitations of each type of equipment are discussed. Variables to be controlled or included in future tests are also discussed. Author (GRA)

N79-12713# Dynamic Science, Phoenix, Ariz.
EVALUATION OF OCCUPANT PROTECTION DEVICES AND RESTRAINT SYSTEMS Final Test Report, Aug. - Oct. 1977

Richard W. Carr Dec. 1977 133 p
(Contract DOT-HS-7-01542)
(PB-284299/5; DOT-HS-803420; Rept-3994-77-189) Avail: NTIS HC A07/MF A01 CSCL 13F

The results of four full-scale crash tests are presented. The object of these tests was to gather data for evaluating Volvo air cushion restrain (ACR) systems and conventional Volvo three-point belt restraint systems during a high speed frontal car-to-car collision. gra

N79-12714# Man Factors, Inc., San Diego, Calif.
DEVELOPMENT OF RECOMMENDATIONS TO IMPROVE CONTROLS OPERABILITY Final Report, Jul. 1976 - Nov. 1977

T. L. Black, W. E. Woodson, and P. H. Selby Nov. 1977 209 p refs
(Contract DOT-HS-6-01445)
(PB-284433/0; MFI-77-108(F); DOT-HS-803456) Avail: NTIS HC A10/MF A01 CSCL 13F

Automobile driver control locations and operational modes and expectancies were studied in order to develop recommendations for modifying Federal Motor Vehicle Safety Standard No. 101. Study phases included: (1) a field investigation of driver controls operation expectancies; (2) derivation and review of proposed rule-making recommendations; (3) analysis of current control option provisions in domestic and foreign vehicles; and (4) preparation of recommendations for modification/improvement of FMVSS No. 101 and future research standards. Results include the analysis of control operation expectancy data to support specific recommendations for improved driver-controls interface, and the identification of several areas for rule-making in which current information is inadequate. GRA

55 PLANETARY BIOLOGY

Includes exobiology and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N79-12715*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
CONFERENCE ON THE PROGRAMMING ENVIRONMENT FOR DEVELOPMENT OF NUMERICAL SOFTWARE

C. L. Lawson 18 Oct. 1978 86 p refs Conf. held at Pasadena, Calif., 18-20 Oct. 1978; sponsored by JPL and ACM-Signum
(Contract NAS7-100)
(NASA-CR-157933; JPL-Pub-78-92) Avail: NTIS

HC A05/MF A01 CSCL 09B

Systematic approaches to numerical software development and testing are presented. For individual titles, see N79-12716 through N79-12736.

N79-12716*# Los Alamos Scientific Lab., N. Mex.
A CORE + MODULES APPROACH TO FORTRAN STANDARDIZATION **c61**
Walt Brainerd *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 1-2 (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

A framework for the revision of FORTRAN 77 is presented. There are two kinds of changes: features added to FORTRAN 77, and features remaining in FORTRAN 77 but not included in the core. The net effect of these changes is the following: (1) subroutine linkage facilities are enhanced to improve the interface with applications modules written in FORTRAN, (2) archaic control structures are replaced with modern ones, (3) the concept of storage association is removed, and (4) fixed-form source is replaced with free-form source. S.B.S.

N79-12717*# Xerox Corp., Rochester, N. Y.
NUMERICAL PRECISION AND DATA STRUCTURES **c60**
Werner Schenk *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 3-6 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

Technical proposals and recommendations for revising FORTRAN were studied and categorized. In the area of numerical precision, the proposals basically agree on a set of necessary parameters, although a wide range of nomenclature and specific function names are used. Environmental parameters identified include the following: (1) base of floating point representation, (2) largest positive real number, exponent and integer, (3) largest negative real number, exponent and integer, (4) number of significant digits, and (5) exponent bias. S.B.S.

N79-12718*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE IFIP WG 2.5 PROPOSALS ON FORTRAN **c61**
Charles L. Lawson *In its* Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 7-10 refs (For primary document see N79-12715 03-59)
(Contract NAS7-100)
Avail: NTIS HC A05/MF A01 CSCL 09B

Language problem areas are summarized and possible solutions are discussed. Areas covered are: (1) double complex, (2) arrays of work space in library subroutines, (3) calls from a library subprogram to user code, (4) decomposition and synthesis of floating-point numbers, (5) environment parameters, (6) precision function, and (7) control structures. S.B.S.

N79-12719*# Bell Telephone Labs., Inc., Murray Hill, N. J.
ENVIRONMENT PARAMETERS AND BASIC FUNCTIONS FOR FLOATING-POINT COMPUTATION **c61**
W. S. Brown and S. I. Feldman *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 11-14 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

A language-independent proposal for environment parameters and basic functions for floating-point computation is presented. Basic functions are proposed to analyze, synthesize, and scale floating-point numbers. The model provides a small set of parameters and a small set of axioms along with sharp measures of roundoff error. The parameters and functions can be used to write portable and robust codes that deal intimately with the floating-point representation. Subject to underflow and overflow constraints, a number can be scaled by a power of the floating-point radix inexpensively and without loss of precision. A specific representation for FORTRAN is included. S.B.S.

N79-12720*# Argonne National Lab., Ill. Applied Mathematics Div.
A COMPARISON OF TWO RECENT APPROACHES TO MACHINE PARAMETERIZATION FOR MATHEMATICAL SOFTWARE **c60**
Brian T. Smith *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 15-17 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

Two proposals for expressing the dependence of numerical software on the environment are examined. The approaches are briefly summarized and the differences and similarities are discussed. One proposal characterizes the dependence of the software on the machine architecture essentially in terms of the representation of floating point entities in the machine. The second characterizes the dependence of the software on the environment in terms of models both of the floating point numbers and of the behavior of the arithmetic unit of the machine. S.B.S.

N79-12721*# Bell Telephone Labs., Inc., Murray Hill, N. J.
UNIX AS AN ENVIRONMENT FOR PRODUCING NUMERICAL SOFTWARE **c62**
N. L. Schryer *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 18-22 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

The UNIX operating system supports a number of software tools; a mathematical equation-setting language, a phototypesetting language, a FORTRAN preprocessor language, a text editor, and a command interpreter. The design, implementation, documentation, and maintenance of a portable FORTRAN test of the floating-point arithmetic unit of a computer is used to illustrate these tools at work. S.B.S.

N79-12722*# Boeing Co., Seattle, Wash.
THE AUGMENT PRECOMPILER AS A TOOL FOR THE DEVELOPMENT OF SPECIAL PURPOSE ARITHMETIC PACKAGES **c61**
F. D. Crary and J. M. Yohe *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 23-26 refs Prepared in cooperation with Wisconsin Univ.-Madison (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

A FORTRAN precompiler, AUGMENT, is used to develop packages for nonstandard arithmetics. It renders the source code more lucid, reduces the number of lines of code in a nonstandard arithmetic package, facilitates modification, and decreases the problems of transporting such a package to another host system. AUGMENT is briefly described and its use in the construction of the interval package is discussed. Other applications of AUGMENT are also included. S.B.S.

N79-12723*# Argonne National Lab., Ill. Applied Mathematics Div.
EXTENDING RELIABILITY: TRANSFORMATIONAL TAILORING OF ABSTRACT MATHEMATICAL SOFTWARE **c61**
James M. Boyle *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 27-30 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

Methods for automatically constructing concrete executable programs from an abstract prototype program by applying transformations based on theorems of matrix algebra and on algebraic properties of programming languages are described. These methods provide a user with highly efficient programs tailored to his environment while maintaining the advantages of high reliability and low cost associated with routines from the best mathematical software libraries. Also, the transformations which produce such programs represent a formal codification of rules for writing linear algebra programs. S.B.S.

N79-12724*# Softool Corp., Goleta, Calif.
FORTRAN TOOLS **c61**
Leon Presser *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 31-32 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

An integrated set of FORTRAN tools that are commercially available is described. The basic purpose of various tools is summarized and their economic impact highlighted. The areas addressed by these tools include: code auditing, error detection, program portability, program instrumentation, documentation, clerical aids, and quality assurance. S.B.S.

N79-12725*# Colorado Univ., Boulder. Dept. of Computer Science.
USING TOOLS FOR VERIFICATION, DOCUMENTATION AND TESTING **c61**
Leon J. Osterweil *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 33-37 refs (For primary document see N79-12715 03-59)
(Grant NSF MCS-77-02194)
Avail: NTIS HC A05/MF A01 CSCL 09B

Methodologies are discussed on four of the major approaches to program upgrading -- namely dynamic testing, symbolic execution, formal verification and static analysis. The different patterns of strengths, weaknesses and applications of these approaches are shown. It is demonstrated that these patterns are in many ways complementary, offering the hope that they can be coordinated and unified into a single comprehensive program testing and verification system capable of performing a diverse and useful variety of error detection, verification and documentation functions. L.S.

N79-12726*# California Univ., Santa Barbara. Dept. of Mathematics.
A CASE FOR TOOLPACK **c61**
Webb Miller *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 38-40 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

A collaborative effort is proposed to develop a systematized collection of software tools for FORTRAN programming. Author

N79-12727*# Argonne National Lab., Ill. Applied Mathematics Div.
PROGRAMMABLE FORMATTING OF PROGRAM TEXT: EXPERIENCES DRAWN FROM THE TAMPR SYSTEM **c61**
Kenneth W. Dritz *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 41-42 refs Sponsored by DOE (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

The TAMPR System originated as an approach to the problem of automating the routine modifications of FORTRAN source programs required to adapt them to a variety of uses or environments. Three steps are involved: (1) A FORTRAN source program is processed by the TAMPR Recognizer, yielding essentially a parse tree called the abstract form, (2) the Transformation Interpreter applies IGT's (Intragrammatical Transformations) to the abstract form as tree operations, and (3) the abstract form is then reconverted to source program form by the Formatter. By ensuring that the transformations are applied only to the correct syntactic entities and only in the intended contexts, the use of the abstract form greatly simplifies establishing the reliability of the overall process. L.S.

N79-12728*# Stanford Univ., Calif.
NEW LANGUAGES FOR NUMERICAL SOFTWARE **c61**
Eric Grosse *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 43-46 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

Existing languages for numerical software are not altogether satisfactory. FORTRAN, even preprocessed, has troublesome limitations. Unfortunately, proposed replacements are discouragingly large, or omit essential features like variably dimensioned arrays and FORTRAN capability. A new language was designed to include such crucial features, but otherwise be as small as possible. This language, called T, includes: indention to indicate block structure, novel loop syntax, and engineering format for real constants. By preprocessing into PL/1, implementation cost was kept low. L.S.

N79-12729*# Bell Telephone Labs., Inc., Murray Hill, N. J.
THE PROGRAMMING LANGUAGE EFL **c61**
S. I. Feldman *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 47-50 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

EFL is a comprehensive language designed to make it easy to write portable, understandable programs. It provides a rich set of data types and structures, a convenient operator set, and good control flow forms. The lexical form is easy to type and to read. Whenever possible, EFL uses the same forms that Ratfor does; in this sense EFL may be viewed as a superset of Ratfor. EFL is a well-defined language; this distinguishes it from most FORTRAN preprocessors which only add simple flow of control constructs to FORTRAN. The EFL compiler generates (possibly tailored) Standard FORTRAN as its output. EFL should catch and diagnose all syntax errors. L.S.

N79-12730*# Bell Telephone Labs., Inc., Murray Hill, N. J.
DESIGN PRINCIPLES OF THE PORT LIBRARY **c61**
Phyllis Fox *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 51-53 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

The design of PORT stemmed from the basic principles of portability and ease of use. The attributes and mechanisms used in the library to support this philosophy include the use of a portable subset of FORTRAN, and the use of (machine-dependent) functions to supply the necessary environment parameters. Abbreviated calling sequences are mede possible by a simplified error-handling technique, and by the use of a portable stack allocator for temporary workspace. Experiences to date with these approaches, and plans for the future are reviewed. Author

N79-12731*# International Mathematical and Statistical Library, Houston, Tex.
THE IMSL ENVIRONMENT FOR SOFTWARE DEVELOPMENT **c61**
T. J. Aird and D. G. Kainer *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 54-56 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

The international mathematical and statistical library (IMSL) developed a set of macros and a file naming convention that automates the subroutine development and testing process over ten computer types. The IMSL software development system is implemented on a Data General Eclipse C330 computer with 256K bytes of central memory and 192M bytes of disk storage using the AOS Operating System. RJE activity is handled by a Data 100 communications computer. The system allows the programmer to work with basis decks. Distribution decks are generated, by the IMSL FORTRAN converter, as they are needed for testing and whenever the basis deck has been modified. Author

N79-12732*# Argonne National Lab., Ill. National Energy Software Center.
PORTABILITY AND THE NATIONAL ENERGY SOFTWARE CENTER **c61**
Margaret K. Butler *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 58-60 (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

The software portability problem is examined from the viewpoint of experience gained in the operation of a software exchange and information center. First, the factors contributing to the program interchange to date are identified, then major problem areas remaining are noted. The import of the development of programming language and documentation standards is noted, and the program packaging procedures and dissemination practices employed by the Center to facilitate successful software transport are described. Organization, or installation, dependencies of the computing environment, often hidden from the program author, and data interchange complexities are seen as today's primary issues with dedicated processors and network communications offering an alternative solution. Author

N79-12733*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A TRANSPORTABLE SYSTEM FOR MANAGEMENT AND EXCHANGE OF PROGRAMS AND OTHER TEXT **c61**
W. V. Snyder *In its* Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 61-64 (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

A system is presented for exchanging information on tape, that allows information about the data to be included with the

data. The system is designed for portability, but requires a few simple machine dependent modules. These modules are available for a variety of machines, and a bootstrapping procedure is provided. The system allows content selected reading of the tape, and a simple text editing facility is provided. Although the system recognizes 30 commands, information may be extracted from the tape by using as few as three commands. In addition to its use for information exchange, the system is expected to find use in maintaining large libraries of text. Author

N79-12734*# California Univ., San Diego. La Jolla. Inst. for Information Systems.
USING PASCAL FOR NUMERICAL ANALYSIS c61
Dennis Volper and Terrence C. Miller *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 64-66 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

The data structures and control structures of PASCAL enhance the coding ability of the programmer. Proposed extensions to the language further increase its usefulness in writing numeric programs and support packages for numeric programs. Author

N79-12735*# Toronto Univ. (Ontario). Dept. of Computer Science.
DESIRABLE FLOATING-POINT ARITHMETIC AND ELEMENTARY FUNCTIONS FOR NUMERICAL COMPUTATION c64
T. E. Hull *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 67-70 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 12A

The topics considered are: (1) the base of the number system, (2) precision control, (3) number representation, (4) arithmetic operations, (5) other basic operations, (6) elementary functions, and (7) exception handling. The possibility of doing without fixed-point arithmetic is also mentioned. The specifications are intended to be entirely at the level of a programming language such as FORTRAN. The emphasis is on convenience and simplicity from the user's point of view. Conforming to such specifications would have obvious beneficial implications for the portability of numerical software, and for proving programs correct, as well as attempting to provide facilities which are most suitable for the user. The specifications are not complete in every detail, but it is intended that they be complete in spirit - some further details, especially syntatic details, would have to be provided, but the proposals are otherwise relatively complete. Author

N79-12736*# Purdue Univ., Lafayette, Ind. Mathematical Sciences Div.
PROGRAMMING EFFORT ANALYSIS OF THE ELLPACK LANGUAGE c61
John R. Rice *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 72-74 refs (For primary document see N79-12715 03-59)
(Grant NSF MCS-76-10225)
Avail: NTIS HC A05/MF A01 CSCL 09B

ELLPACK is a problem statement language and system for elliptic partial differential equations which is implemented by a FORTRAN preprocessor. ELLPACK's principal purpose is as a tool for the performance evaluation of software. However, it is used here as an example with which to study the programming effort required for problem solving. It is obvious that problem statement languages can reduce programming effort tremendously; the goal is to quantify this somewhat. This is done by analyzing the lengths and effort (as measured by Halstead's software science technique) of various approaches to solving these problems. Author

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering.*

N79-12737 Illinois Univ. at Chicago Circle, Chicago.
DATABASE MODELING TECHNIQUES WITH APPLICATION TO FUZZY QUERY TRANSLATION Ph.D. Thesis
Jyh-seng Ke 1978 238 p
Avail: Univ. Microfilms Order No. 7824357

A formal model of database skeleton is developed to provide a unified foundation for database modeling and query translation. It is essentially the integration of three levels of data base abstraction: conceptual subschema, conceptual schema, and relational schema. A semi-automatic database modeling technique is developed to provide a tool for concisely defining database skeletons. A unique set of 4NF relations are constructed from the original set of user-specified basic conceptual graphs. An extensible query language (XQL) is designed to provide an intelligent user interface for non-professional users. The XQL language allows the user to input his queries using a flexible language. The user's query need not be precise in the sense that imprecise, or fuzzy, concepts are included. The concepts of file and descriptor are transparent to the user. Techniques for efficient translation of XQL queries are described. Dissert. Abstr.

N79-12738 Vanderbilt Univ., Nashville, Tenn.
DETERMINISTIC SCHEDULING OF I/O BUFFER SYSTEMS Ph.D. Thesis
Robert Patterson Cook 1978 168 p
Avail: Univ. Microfilms Order No. 7823442

Systems composed of expander or contractor filters are examined. An expander filter produces more records than it consumes, and a contractor filter consumes more records than it produces. The first result presented in the thesis demonstrates that a duality relationship exists between contractor and expander systems. Secondly, a lower bound on feasible buffer space is derived as well as an optimum upper bound. Also, a fifty-percent rule is presented which relates buffer size to optimum schedule length. In addition, some interesting relationships are explored between filter systems, and code generation, multiprocessor scheduling, and traditional semaphore operations. Finally, the complexity of deriving optimal schedules is analyzed; several heuristics are developed based on these results; and the performance of these heuristics is verified by comparison with a derived lower bound on schedule lengths. In fact, it is shown that the heuristic differs from the lower bound by no more than a small constant. Dissert. Abstr.

N79-12739 Syracuse Univ., N. Y.
A DATA BASE MANAGEMENT MODELING TECHNIQUES AND SPECIAL FUNCTION HARDWARE ARCHITECTURE Ph.D. Thesis
Gerard Thomas Capraro 1978 261 p
Avail: Univ. Microfilms Order No. 7823549

A mathematical base is developed that can be utilized to model data base management systems from the user level down to the bit level and to develop and evaluate proposed hardware that could be utilized to implement a data dictionary and part of a data directory. The mathematical modeling development is accomplished through set theory and the addition of order to sets. This mathematical base is used to define in detail some of the functions that must be performed in Data Base Management by operating on the following four levels of data: (1) the user computer interface (Reserved Word); (2) the attribute and file or relationship (F/R) names (Data Name); (3) the modifiers of the attribute and F/R names (Data Descriptors); and (4) the occurrences of the attributes and F/Rs (Data Occurrence). Hardware implementation designs are then considered for a subset of these functions and data levels. Dissert. Abstr.

N79-12740 Iowa Univ., Iowa City.
CONVERSATIONAL EXPLORATORY DATA ANALYSIS Ph.D. Thesis
Gerald Lewis Isaacs 1978 122 p
Avail: Univ. Microfilms Order No. 7822411

A data analysis system was developed for computer use that is available at reasonable costs, readily transportable to a wide variety of computer systems, and is constructed in such a way that analysts with varying backgrounds in statistics can use it. There are nine univariate exploratory data analysis techniques which allow the investigator to examine variables one at a time: stem and leaf; empirical probability density

function (EPDF); smoothed EPDF; empirical cumulative distribution function; normal probability plot; standardization; transformation; and trimming. Eight bivariate exploratory data analysis techniques are also presented, which allow the investigator to examine two variables independently, jointly, and conditionally These are: summary statistics; scatter plot; schematic plot; univariate EDA conditional on X; conditional expection plot; standardication; transformation; and trimming. Dissert. Abstr.

N79-12741*# Lockheed Electronics Co., Houston, Tex.
ORBITER MULTIPLEXER-DEMULTIPLEXER (MDM)/SPACE LAB BUS INTERFACE UNIT (SL/BIU) SERIAL DATA INTERFACE EVALUATION, VOLUME 2 Final Test Report
G. L. Tobey NASA. Johnson Space Flight Center May 1978 107 p
(Contract NAS9-15200)
(NASA-CR-151749; LEC-11949; JSC-13906; Note-78-EG-5) Avail: NTIS HC A06/MF A01 CSCL 09B

Tests were performed to evaluate the operating characteristics of the interface between the Space Lab Bus Interface Unit (SL/BIU) and the Orbiter Multiplexer-Demultiplexer (MDM) serial data input-output (SIO) module. This volume contains the test equipment preparation procedures and a detailed description of the Nova/Input Output Processor Simulator (IOPS) software used during the data transfer tests to determine word error rates (WER). For individual titles, see N79-12742 through N79-12743.

N79-12742*# Lockheed Electronics Co., Houston, Tex.
TEST PROCEDURES
In its Orbiter Multiplexer-Demultiplexer (MDM)/Space Lab Bus Interface Unit (SL/BIU) Serial Data Interface Evaluation, Vol. 2 May 1978 56 p (For primary document see N79-12741 03-60) Avail: NTIS HC A06/MF A01 CSCL 09B

The test procedures required to evaluate the performance of the Space Lab Bus Interface Unit (SL/BIU) are described. This level of testing involves the design evaluation of signal levels, timing, and signal-to-noise (S/N) performance. The tests are to be comprehensive in order to provide data on the operational characteristics of the SL/BIU. The evluation tests are designed to accomplish the following determinations as a minimum for component level testing of the SL/BIU: (1) the baseline operation parameters for comparison to ICD 2-05301 requirements; (2) the influence of serial data line parameter variation on the operation of SL/BIU; (3) the effects of noise on discrete and serial data lines (S/N ratio); and (4) the effects of cable length variation. G.Y.

N79-12743*# Lockheed Electronics Co., Houston, Tex.
NOVA/IOPS - MDM/SIO - SL/BIU DATA TRANSFER TEST SOFTWARE GUIDE c61
In its Orbiter Multiplexer-Demultiplexer (MDM)/Space Lab Bus Interface Unit (SL/BIU) Serial Data Interface Evaluation, Vol. 2 May 1978 44 p (For primary document see N79-12741 03-60) Avail: NTIS HC A06/MF A01 CSCL 09B

The NOVA/IOPS (Input-Output Processor Simulator) is used to control all interface testing of the MDM (Multiplexer Demultiplexer) Breadboard S10 10M (serial input-output-input module) and the Matra Space Lab Inerface Unit (SL/BIU). The software handles bookkeeping such as word error rates, types of errors, display of error buffers, data display and test identification. G.Y.

N79-12744*# Systems Research Lab., Champaign, Ill.
DIGITAL CONTROLLER DESIGN. ANALYSIS OF THE ANNULAR SUSPENSION POINTING SYSTEM Bi-monthly Report
D. C. Kuo 1 Nov. 1978 30 p
(Contract NAS8-32358)
(NASA-CR-150846) Avail: NTIS HC A03/MF A01 CSCL 09B

The digital ASPS was designed through decoupling and pole placement. A trial and error method is used to determine the feedback gains to meet the design requirements. The method involves first assuming a desired bandwidth, then the required feedback gains are computed, the digital system is simulated, and the time response is observed to see if the individual bandwidth requirement is satisfied. The digital ASPAS was also designed using the sampling period of 0.02 seconds with larger sampling periods. It is shown that the digital ASPS with state feedback can be stabilized for a sampling period as large as 0.1 seconds. G.Y.

N79-12745*# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
A USER ORIENTED MICROCOMPUTER FACILITY FOR DESIGNING LINEAR QUADRATIC GAUSSIAN FEEDBACK COMPENSATORS
Paul K. Houpt, Jawed Wahid, Timothy L. Johnson, and Steven A. Ward 1978 20 p refs
(Grant NGR-22-009-124; Contract N00014-75-C-0061)
(NASA-CR-157941; LIDS-P-856) Avail: NTIS HC A02/MF A01 CSCL 09B

A laboratory design facility for digital microprocessor implementation of linear-quadratic-Gaussian feedback compensators is described. Outputs from user interactive programs for solving infinite time horizon LQ regulator and Kalman filter problems were conditioned for implementation on the laboratory microcomputer system. The software consisted of two parts: an offline high-level program for solving the LQ Ricatti equations and generating associated feedback and filter gains and a cross compiler/macro assembler which generates object code for the target microprocessor system. A PDP 11/70 with a UNIX operating system was used for all high level program and data management, and the target microprocessor system is an Intel MDS (8080-based processor). Application to the control of a two dimensional inverted pendulum is presented and issues in expanding the design/prototyping system to other target machine architectures are discussed. G.G.

N79-12746# Dayton Univ. Research Inst., Ohio.
AFML SCIENTIFIC AND ENGINEERING COMPUTER SUPPORT Final Report, 15 May 1975 - 15 Nov. 1976
Dale L. Ford, Thomas Wood, Michael Dennis, and Duane G. Leet Dec. 1977 190 p refs
(Contract F33615-75-C-5191; AF Proj. 6106; AF Proj. 9993)
(AD-A058193; UDRI-TR-77-10; AFML-TR-77-231) Avail: NTIS HC A09/MF A01 CSCL 09/2

This report summarizes the work performed in providing scientific and engineering computer support to various projects within AFML during this time period. This work includes exploitation of all computers available to AFML researchers. This report is divided into major topics: (1) Automated Experiments and Data Acquisition, (2) Computer Programs for Reentry and Laser Applications of Ablation/Thermal Effects, (3) Computer Analysis of Microstructures, and (4) General User Programs and Education. GRA

N79-12747# Illinois Univ. at Urbana-Champaign, Urbana. Coordinated Science Lab.
A MODEL FOR A NATURAL LANGUAGE DATA BASE SYSTEM M.S. Thesis
Bradley Alan Goodman Oct. 1977 116 p refs
(Contract N00014-67-A-0305-0026)
(AD-A057641; R-798; UILU-ENG-77-2245) Avail: NTIS HC A06/MF A01 CSCL 09/2

A system called PLANES (for Programmed LANguage-based Enquiry System) is under development at this laboratory. The primary objective of PLANES is to allow a non-programmer to obtain information from a large data base with minimal prior training or experience. Such a system must understand a substantial degree of a user's natural language and guide and educate him to formulate requests in a form the system can understand. The system must handle complex syntactic structures, abbreviations, pronoun reference and ellipsis. The system must also give back explicit answers and not just retrieve a file. Minor errors--such as spelling and grammatical errors--should be tolerated. The system should be interactive and on-line, provide clarifying dialogues, operate fairly rapidly, and should be relatively easy to extend. See also AD-A028 316. GRA

N79-12748# Massachusetts Inst. of Tech., Cambridge. Center for Information Systems Research.
AN APPROACH TO CONSTRUCTING FUNCTIONAL REQUIREMENT STATEMENTS FOR SYSTEM ARCHITECTURAL DESIGN

S. L. Huff and S. E. Madnick Jun. 1978 91 p refs
(Contract N00039-78-G-0160)
(AD-A057802; CISR-P010-7806-06; CISR-TR-6) Avail: NTIS HC A05/MF A01 CSCL 09/2

The objective of this study is to develop a systematic approach to the architectural design of complex software systems. In this report, the problem of creating functional requirements, which become the input to the design structuring methodology, is investigated. Presently available requirement statement languages, such as PSL (Problem Statement Language) are examined, and the conclusion is drawn that such schemes are not very appropriate for the expression of requirements prior to system design. Certain key concepts used frequently in the requirements analysis and specification literature are then examined and clarified, and related together in the context of a simple framework. An alternative approach to specifying requirements, based upon a set of requirement templates, is proposed and its application illustrated. Finally, the appendices contain detailed information regarding PSL syntax and semantics, as well as an application of the template approach to the requirements for a real-life database management system. GRA

N79-12749# Illinois Univ. at Urbana-Champaign, Urbana. Coordinated Science Lab.
COMPUTER SYSTEM DESIGN USING A HIERARCHICAL APPROACH TO PERFORMANCE EVALUATION Ph.D. Thesis
Balasubramanian Kumar Oct. 1977 171 p refs
(Contract DAAB07-72-C-0259; Grant NSF MCS-73-03488)
(AD-A057646; R-799; UILU-ENG-77-2246) Avail: NTIS HC A08/MF A01 CSCL 05/1

The concept of a hierarchy of system models for the performance evaluation of computer systems is introduced. The characteristics and construction of such a hierarchy are discussed. Since it consists of models that span a wide range of complexity and cost, such a hierarchy is a very useful tool in the cost-effective design of computer systems. A procedure that uses such a hierarchy in computer system design is developed. The procedure uses the hierarchy to trade off cost and accuracy of system performance predictions. The viability and usefulness of the procedure are demonstrated by applying it to the optimization of the architecture of a complex computer system - the CPU-memory subsystem of the IBM System 360/Model 91. In most of the experiments conducted, the procedure converged, if not to the exact optimum, at least to within a very near region of the optimum. A sensitivity analysis procedure is then used to identify the exact optimum, as well as to determine the sensitivity of the objective function to changes in the system parameters. The efficiency of the overall procedure is shown to be considerably greater than that of the worst-case approach to system design. GRA

N79-12750# Naval Postgraduate School, Monterey, Calif.
MICROCOMPUTER BASED FLIGHT DATA RECORDER/MONITOR WITH SOLID STATE MEMORY M.S. Thesis
Darl Eugene Easton Jun. 1978 145 p refs
(AD-A057990) Avail: NTIS HC A07/MF A01 CSCL 01/4

The design, breadboard implementation and functional testing of a Digital Flight Data Recorder/Monitor prototype is reported. Microcomputer interfacing to Magnetic Bubble Memory and a digital data bus was accomplished. The microcomputer is to be used to collect and analyze flight parameters and record only significant data for later use in an accident investigation or maintenance debriefings for accident prevention. The Magnetic Bubble Memory is the nonvolatile recording media. The digital data bus interface to the IEEE 488 instrument bus will allow operational testing of the recorder on an aircraft equipped with a complete data acquisition system. Author (GRA)

N79-12751# Harvard Univ., Cambridge, Mass. Center for Research in Computing Technology.
ABSTRACT MODEL OF MSG: FIRST PHASE OF AN EXPERIMENT IN SOFTWARE DEVELOPMENT
Glenn H. Holloway, William R. Gush, and George H. Mealy Aug. 1978 171 p
(Grant N00039-78-G-0020; ARPA Order 3079)
(AD-A058039) Avail: NTIS HC A08/MF A01 CSCL 09/2

This report describes the first phase of an experiment designed to demonstrate techniques for software development and evolution. The experiment involves the production of a family of functionally similar systems on dissimilar host computers with markedly different operating systems. The basic technique being used is machine assisted stepwise refinement from an abstract model program that embodies the desired characteristic of the family members without overconstraining the individual implementations. The example system being developed in this experiment is MSG, the interprocess communication component of the National Software Works (NSW). MSG has already been specified and implemented by conventional means for several host computers. The experiment consists of: production of an abstract model of the MSG family, realization of MSG on two actual hosts, to study the incremental costs of producing new instances by our techniques from a suitable model, and evolution of the MSG family in accord with actual changes to the MSG specification as they arise, to evaluate the efficiencies of maintaining families in unison. Author (GRA)

N79-12752# Pennsylvania Univ., Philadelphia. Dept. of Decision Sciences.
THE DATA SYSTEM M.S. Thesis
Keith Allen Kimball 1978 68 p
(Contract N00014-75-C-0462)
(AD-A057321; Rept-78-04-03) Avail: NTIS HC A04/MF A01 CSCL 09/2

This thesis presents the DATA (Dynamic Alerting Transaction Analysis) System as an alternative to a conventional database management system. The DATA System contains no records corresponding to entities but rather is simply a time ordered list of transactions. The advantages of DATA in the areas of security, integrity, and operational ease is discussed and the concept of alerting is presented. An alerting system provides facilities to monitor changes to the database in order to perform some action whenever certain conditions become true. An alerter can be thought of as a program that continuously monitors the database and takes some specified action when the corresponding condition becomes true. The DATA system is an excellent tool to implement alerting due to its ability to view the database at previous points in time. The work describes the implementation of the DATA System. GRA

N79-12753# General Electric Co., Schenectady, N. Y.
ADVANCED ARCHIVAL MEMORY Quarterly Report, 16 Jul. - 15 Oct. 1976
C. O. Lemmond, P. V. Gray, C. G. Kirkpatrick, B. D. Nathan, and J. F. Norton Wright-Patterson AFB, Ohio AFAL Apr. 1977 167 p refs
(Contract F33615-76-C-1322; ARPA Order 3194)
(AD-A058198; SRD-77-074; AFAL-TR-77-35) Avail: NTIS HC A08/MF A01 CSCL 09/2

During this reporting period, effort in the archival memory program included experimental work and theoretical studies on planar diode structures (memory target substrate), implantation of ions to write information on a planar diode structure, feasibility studies of the alloy junction method of writing using a Nd:YAG laser, the design and construction of a heated stage for alloy junction studies and the initiation of writing optics studies. Studies and experimental verifications indicate that ion beam writing can be achieved using field emission ion sources. Alloy junction bit sites were successfully formed using a laser beam. Author (GRA)

N79-12754# National Technical Information Service, Springfield, Va.
MINICOMPUTERS, VOLUME 2. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, Jul. 1975 - Jul. 1978
George W. Reimherr Sep. 1978 236 p Supersedes NTIS/PS-77/0755; NTIS/PS-76/0673; NTIS/PS-75/572; NTIS/PS-74/102
(NTIS/PS-78/0935/3; NTIS/PS-77/0755; NTIS/PS-76/0673; NTIS/PS-75/572; NTIS/PS-74/102) Avail: NTIS HC $28.00/MF $28.00 CSCL 09B

The bibliography cites reports on the design and applications of minicomputers. A few of the areas of application include audio recorders, chemical analysis, radiation detection, process control, reactor control, production control, ocean sciences, and tracking systems. Citations include supporting software for solving

the problems and processing the data in the many areas of application. GRA

N79-12755# National Technical Information Service, Springfield, Va.
TRENDS IN COMPUTER TECHNOLOGY. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Jul. 1978
George W. Reimherr Sep. 1978 109 p Supersedes NTIS/PS-77/0762; NTIS/PS-76/0722; NTIS/PS-75/657 (NTIS/PS-78/0937/9; NTIS/PS-77/0762; NTIS/PS-76/0722; NTIS/PS-75/657) Avail: NTIS HC $28.00/MF $28.00 CSCL 09B

Past, present, and future trends in computer hardware development and computer software generation are cited. The bibliography also includes prospects, problems, and pitfalls in the development of computer technology. This updated bibliography contains 103 abstracts, 12 of which are new entries to the previous edition. GRA

N79-12756# National Technical Information Service, Springfield, Va.
MAGNETIC BUBBLE DOMAINS. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Aug. 1978
George W. Reimherr Sep. 1978 110 p Supersedes NTIS/PS-77/0880; NTIS/PS-76/0798; NTIS/PS-75/0686 (NTIS/PS-78/0950/2; NTIS/PS-77/0880; NTIS/PS-76/0798; NTIS/PS-75/0686) Avail: NTIS HC $28.00/MF $28.00 CSCL 09B

The discussions on material properties, crystal growth, domain structure and motion, nuclear radiation effects, and applications as magnetic memory devices are cited. This updated bibliography contains 104 abstracts, 8 of which are new entries to the previous edition. GRA

N79-12757# National Technical Information Service, Springfield, Va.
READ ONLY MEMORIES. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Aug. 1978
George W. Reimherr Sep. 1978 102 p Supersedes NTIS/PS-77/0866; NTIS/PS-76/0860; NTIS/PS-75/789 (NTIS/PS-78/0951/0; NTIS/PS-77/0866; NTIS/PS-76/0860; NTIS/PS-75/789) Avail: NTIS HC $28.00/MF $28.00 CSCL 09B

The bibliography cites research reports on the design, development, and application of read only memories. Optical read-only storage, and software for read only memories, are included. GRA

N79-12717*# Xerox Corp., Rochester, N. Y.
NUMERICAL PRECISION AND DATA STRUCTURES
Werner Schenk *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 3-6 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

N79-12720*# Argonne National Lab., Ill. Applied Mathematics Div.
A COMPARISON OF TWO RECENT APPROACHES TO MACHINE PARAMETERIZATION FOR MATHEMATICAL SOFTWARE
Brian T. Smith *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 15-17 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N79-12758 Stevens Inst. of Tech., Hoboken, N. J.
STRUCTURING PROGRAMS FOR EFFICIENT OPERATION IN VIRTUAL MEMORY SYSTEMS Ph.D. Thesis
Anthony Louis Barrese 1978 104 p
Avail: Univ. Microfilms Order No. 7821609

Procedures are presented which preserve the inherent locality of reference behaviour during the process of mapping program modules into pages. A Markov model is used in the procedures as a guide for parameter measurements and inferences. The techniques described are applicable to completed programs as well as those under development. Experimental results are given showing relative improvement in performance achievable through the use of these techniques. Comparisons are made with various suboptimal module to page assignments. By applying the techniques to actual programs a 90% reduction in page fault rate when compared with the worst case assignment is observed. Dissert. Abstr.

N79-12759 Washington Univ., Seattle.
A HYBRID PARADIGM FOR COMPUTER PROGRAMMING AND ITS INVESTIGATION IN THE CONTEXT OF ELECTRONIC CIRCUIT SIMULATION BY MEANS OF AN EXTENSIBLE LANGUAGE Ph.D. Thesis
William Seabrook Beckett, Jr. 1978 142 p
Avail: Univ. Microfilms Order No. 7820701

The sequential control mechanism which forms the architectural basis for digital computer programs is augmented by an interpretation scheme capable of supporting the more naturally parallel signal processing methods used in the design of electronic equipment. A general purpose simulation language based on the resulting extended control structure is presented along with evidence that the language can effectively enlarge the class of routinely solvable problems. This language is extensible through a macro expansion technique and includes fully automated control and coordination of both a discrete event scheduler and a heuristically supervised nonlinear equation solver. A general outline for planning the structure of simulation programs is presented through a set of analog, digital, and hybrid circuit simulation examples ranging in complexity from a simple one transistor amplifier to a complete floating point CPU. Dissert. Abstr.

N79-12760 Duke Univ., Durham, N. C.
A DATA STRUCTURE MODEL ALLOWING CONCURRENT ACCESS Ph.D. Thesis
Bert Alton Brantley, Jr. 1978 215 p
Avail: Univ. Microfilms Order No. 7821293

General considerations of a data base are presented, followed by review of the current data base system and operating system concepts. A data structure model is then developed which allows alternation of representation without affecting logical relationships and includes multi-list structures. The model has three levels. The first level, the structure prototype, defines how a data structure is to be maintained and therefore determines both the storage requirements and manipulation times of a structure so implemented. The second level of the data structure model is the structure type definition, which associates a logical relationship to two classes of nodes, one node class becoming eligible to be the base of the structure and the other class being eligible for membership in the structure. The third level is a set of nodes having the structures as specified by the structure type. Dissert. Abstr.

N79-12761 California Univ., Los Angeles.
IMPROVING SOFTWARE RELIABILITY BY N-VERSION PROGRAMMING Ph.D. Thesis
Liming Chen 1978 117 p
Avail: Univ. Microfilms Order No. 7820195

N-version programming is studied as a means to improve software reliability through the provision of a special form of software redundancy. To implement N-version programming, three special mechanisms are necessary. These special mechanisms are: (1) comparison vectors specifying data formats of corresponding results to be compared; (2) comparison status indicators containing information about the result of a comparison; and (3) synchronization mechanisms used to coordinate the execution of an N-version software unit. The points at which comparison vectors are generated and employed for comparison are called cross-check points. A methodology was devised to implement N-version programming. Dissert. Abstr.

N79-12762 California Univ., Los Angeles.
THE DESIGN, IMPLEMENTATION AND CORRECTNESS OF AN EXPRESSION-ORIENTED LANGUAGE FOR MICRO-

COMPUTERS Ph.D. Thesis
James Craig Cleaveland 1978 221 p
Avail: Univ. Microfilms Order No. 7820199

DELTA is a programming language designed for interactive programming on microcomputers. The design of Delta is described both informally and formally (via denotational semantics). The implementation of DELTA is described, including a detailed analysis of compaction (garbage collection). The proof of correctness of DELTA's implementation shows that its implementation is equivalent to its definition. Two models of the implementation, called the abstract interpreter and the concrete interpreter, are constructed. The abstract interpreter is proved equivalent to the definition of DELTA by means of two nested inductions. The concrete interpreter is shown to be equivalent to the abstract interpreter using techniques employed to prove the correctness of data representations. Dissert. Abstr.

N79-12763 California Univ., Los Angeles.
SEMANTICS AND CORRECTNESS OF CLASSES OF DETERMINISTIC AND NONDETERMINISTIC RECURSIVE PROGRAMS Ph.D. Thesis
Jean Henri Gallier 1978 254 p
Avail: Univ. Microfilms Order No. 7820218

The semantics and correctness of a class of nondeterministic flowchart programs with recursive procedures are studied. A rigorous definition of the semantics of a program on the verification methods to check that programs behave correctly are provided. Notions of category theory and properties of partial orders are reviewed. The syntax and the operational semantics of a class of nondeterministic flowchart schemes with recursive procedures are studied. The class of schemes, the notion of an interpretation, and the relation computed by a program using an operational approach based on the notion of an execution tree are defined. Two other approaches for defining the semantics of a nondeterministic program with recursive procedures is investigated. A new inductive assertion method applying to the full class of nondeterministic flow chart programs with recursive procedures is formulated. The work done is summarized and directions for further research are suggested. Dissert. Abstr.

N79-12764 Illinois Univ. at Urbana-Champaign, Urbana.
METHODS FOR AUTOMATIC ERROR ANALYSIS OF NUMERICAL ALGORITHMS Ph.D. Thesis
John Leonard Larson 1978 106 p
Avail: Univ. Microfilms Order No. 7820985

A technique is developed which generates a system of equations employed by the error analyses, and requires an order of magnitude less time and storage than present techniques. A heuristic approximation method is also described. These methods are compared with the 2-norm approximation methods of Miller. The error analyses provide alternative criteria by which algorithms that solve the same problem may be compared. The analysis of a composite algorithm, which is made up of concatenated sub-algorithms is given in terms of analyses done on its parts. Limited algorithm improvement is obtained by the location of sensitive operations, and the substitution of mathematically equivalent expressions. Dissert. Abstr.

N79-12765 Yale Univ., New Haven, Conn.
HIERARCHICAL IMPLEMENTATION OF OPERATIONS RESEARCH MODELS USING A CONVERSATIONAL MODELLING LANGUAGE Ph.D. Thesis
Ronald Eugene Mills 1978 260 p
Avail: Univ. Microfilms Order No. 7820165

A model of the human information processing required to implement Operations Research models on computers, and extensible, interactive, general-purpose computer programming and modelling system is presented. The Conversational Modelling Language (CML) was designed, implemented and tested in diverse research settings. Mechanisms for constructing hierarchies of progressively more problem-oriented languages, support interaction with discrete event digital simulations, interactive debugging, consistent compile and execution time environments, interpretive execution, flexible dynamic data structures, dynamic program management, text editing, and LP model generation and interactive statistical analysis of large data bases are provided for by CML. Dissert. Abstr.

N79-12766 New York Univ., N. Y.
GYVE, A PROGRAMMING LANGUAGE FOR PROTECTION AND CONTROL IN A CONCURRENT PROCESSING ENVIRONMENT Ph.D. Thesis
Philip Sidell Shaw 1978 1333 p
Avail: Univ. Microfilms Order No. 7824276

The design of a programming language, called GYVE, which incorporates mechanisms for protection and resource control as required in the concurrent processing environment of computer operating systems, process control systems is presented. The protection features of the language are based on the use of modes and mode instances, similar to the Simula-67 class notion, and on the static validation of access rights. The mode organization allows the definition of highly disciplined data types which can only be accessed in specified ways (by calling the entry procedures of the mode). Modes are further specified as private or shared, where instances of shared modes may be accessed by multiple processes, with implied mutual exclusion on each access. Instances of shared modes correspond to Hoare's monitors. Dissert. Abstr.

N79-12767 Michigan Univ., Ann Arbor.
ASSOCIATIVE PROCESSING AND ITS EXTENSIONS Ph.D. Thesis
Jamshed Dadi Mulla 1978 168 p
Avail: Univ. Microfilms Order No. 7822970

The formulation and systematic extension of the concept of associative processing are described. Present associative processing systems are represented by the conventional associative processor (CAP) which is formally defined. The extended associative processor (EAP) and the multiple instruction associative processor (MIAP) are also defined. The EAP eliminates some of the drawbacks of the CAP caused by its single instruction, multiple data (SIMD) mode of operation. The MIAP provides an even more effective extension by completely eliminating the SIMD restriction. Characteristics of the associative procedure that enhance the advantages of the MIAP are identified. A high-level, associative processing language is introduced. Dissert. Abstr.

N79-12768 Iowa Univ., Iowa City.
ANALYSIS OF STRING PATTERNS USING A PROCEDURE-TYPE MODEL AND FORMAL LANGUAGES Ph.D. Thesis
Ranjan Sharatchandra Limaye 1978 275 p
Avail: Univ. Microfilms Order No. 7822422

String pattern matching has become an important area in the field of Computer Science and is reflected in the creation of special types of programming languages for pattern matching such as SNOBOL4. The difficulty in understanding the SNOBOL4 pattern matching processes are examined. A simple procedure-type model for patterns is developed. The procedures are written in a simple programming language. The problem in the efficiency of pattern matching processes is discussed. Classification of pattern matching processes are based on formal languages. A concept of univalue patterns is presented for patterns including immediate value assignment. Dissert. Abstr.

N79-12769 Wisconsin Univ. - Madison.
ERROR ANALYSIS OF SUMMATION TAKING INTO ACCOUNT COMPUTER CHARACTERISTICS, SPECIFIC PROGRAMMING SYSTEM, AND DATA QUALITY Ph.D. Thesis
Peter Andrew Gutterman 1978 412 p
Avail: Univ. Microfilms Order No. 7817111

Exploratory algorithms are developed to determine computation errors. The programming system's arithmetic is explored through a high level language, the perspective from which most programmers view arithmetic. Results from exploring six FORTRAN system are presented. These results include the largest and smallest integers, and the floating-point base, exponent range, and number of fraction digits for single and double-precision arithmetic on each system. Floating-point addition is also evaluated. The attainable error bounds are used to design a family of summation methods that can be optimized for speed or accuracy. These summation methods are applied to the statistical computing problem of determining a sample mean and variance. Dissert. Abstr.

N79-12770 Maryland Univ., College Park.
A METHOD FOR THE FORMAL DERIVATION OF PRO-

GRAMS AND ITS APPLICABILITY TO AUTOMATIC PROGRAM SYNTHESIS Ph.D. Thesis
Jeffrey Stanley Gishen 1978 148 p
Avail: Univ. Microfilms Order No. 7823997

A method for the formal derivation of programs is developed, and an effective framework for automatic program synthesis is provided. A set of proof rules are used that ensure the correctness of the resulting program. A set of logical transformations for rewriting program specifications and a set of (correctness preserving) heuristics for selecting termination constraints are developed. The overall method for using the proof rules, transformations, and heuristics is summarized. A procedure is given to implement this derivation method using standard problem reduction search techniques and a set of algorithms to apply each of the derivation rules as a problem reduction operator. Dissert. Abstr.

N79-12771 Carnegie-Mellon Univ., Pittsburgh, Pa.
THE DESIGN AND ANALYSIS OF ALGORITHMS FOR ASYNCHRONOUS MULTIPROCESSORS Ph.D. Thesis
Gerard Maurice Baudet 1978 201 p
Avail: Univ. Microfilms Order No. 7815195

The issues raised by the design and the analysis of parallel algorithms for asynchronous multiprocessors were explored and the various notions and concepts involved with these algorithms were illustrated by considering problems in diverse areas. The thesis demonstrated that asynchronous multiprocessors can be used efficiently in different problem domains, provided that appropriate algorithms are used. Various techniques useful in the analysis of such algorithms were also examined. As evidenced by a series of experimental results, the computation time required by a process to execute several instances of the same task on an asynchronous multiprocessor cannot be regarded as constant and is actually subject to important fluctuations. These fluctuations in computation times have a negative effect on the performance of parallel algorithms when several processes cooperating in the solution of a problem communicate extensively among themselves. Dissert. Abstr.

N79-12772*# Illinois Univ. at Urbana-Champaign, Urbana. Coordinated Science Lab.
ADAPTIVE ALLOCATION OF DECISION MAKING RESPONSIBILITY BETWEEN HUMAN AND COMPUTER IN MULTI-TASK SITUATIONS Ph.D. Thesis
Yee-yeen Chu Sep. 1978 150 p refs
(Grant NsG-2219)
(NASA-CR-157937; T-66) Avail: NTIS HC A07/MF A01 CSCL 09B

A unified formulation of computer-aided, multi-task, decision making is presented. Strategy for the allocation of decision making responsibility between human and computer is developed. The plans of a flight management systems are studied. A model based on the queueing theory was implemented. S.E.S.

N79-12773*# Green Research, Madison, Ala.
MICROCOMPUTER TECHNOLOGY APPLICATIONS: CHARGER AND REGULATOR SOFTWARE FOR A BREADBOARD PROGRAMMABLE POWER PROCESSOR Final Report
David M. Green 26 Oct. 1978 74 p
(Contract NAS8-32896)
(NASA-CR-150862; Rept-0011) Avail: NTIS HC A04/MF A01 CSCL 09B

Software programs are described, one which implements a voltage regulation function, and one which implements a charger function with peak-power tracking of its input. The software, written in modular fashion, is intended as a vehicle for further experimentation with the P-3 system. A control teleprinter allows an operator to make parameter modifications to the control algorithm during experiments. The programs require 3K ROM and 2K ram each. User manuals for each system are included as well as a third program for simple I/O control. Author

N79-12774*# Mississippi State Univ., Mississippi State. Dept. of Electrical Engineering.
A STUDY OF DATA CODING TECHNOLOGY DEVELOPMENTS IN THE 1980-1985 TIME FRAME, VOLUME 2 Report, Sep. 1977 - Dec. 1978
Frank M. Ingels and Mohammad Mehdi Shahsavari Dec. 1978 99 p refs 2 Vol.
(Contract NAS8-31373)
(NASA-CR-150865; MSSU-EIRS-EE-79-1-Vol-2) Avail: NTIS HC A05/MF A01 CSCL 09B

The source parameters of digitized analog data are discussed. Different data compression schemes are outlined and analysis of their implementation are presented. Finally, bandwidth compression techniques are given for video signals. L.S.

N79-12775# Syracuse Univ., N. Y.
BAYESIAN SOFTWARE PREDICTION MODELS. VOLUME 1: AN IMPERFECT DEBUGGING MODEL FOR RELIABILITY AND OTHER QUANTITATIVE MEASURES OF SOFTWARE SYSTEMS Final Technical Report, Dec. 1975 - Mar. 1978
Amrit L. Goel and K. Kumoto Griffiss Air Force Base, New York RADC Jul. 1978 51 p refs
(Contract F30602-76-C-0097; AF Proj. 5581)
(AD-A057870; TR-78-1; RADC-TR-78-155-Vol-1) Avail: NTIS HC A04/MF A01 CSCL 09/2

In this report a stochastic model for software failure phenomena is developed for the case when the errors are not corrected with certainty. Expressions for several quantities of interest are derived to establish quantitative measures for software performance assessment. Approximations for large-scale software systems using a gamma distribution are also discussed. Numerical examples are used to illustrate the computations and usefulness of various quantities. Author (GRA)

N79-12776# Syracuse Univ., N. Y.
BAYESIAN SOFTWARE PREDICTION MODELS. VOLUME 4: BAYESIAN SOFTWARE CORRECTION LIMIT POLICIES Final Technical Report, Dec. 1975 - Mar. 1978
Amrit L. Goel and K. Okumoto Griffiss Air Force Base, New York RADC Jul. 1978 41 p refs
(Contract F30602-76-C-0097; AF Proj. 5581)
(AD-A057873; TR-78-4; RADC-TR-78-155-Vol-4) Avail: NTIS HC A03/MF A01 CSCL 09/2

This report deals with the problem of determining an optimum correction limit policy for a large software system subject to random occurrences of errors in an operational phase. When an error occurs, the corrective action is scheduled for either the programmer (Phase 1) or the system analyst (Phase 2). Two cost models are developed and procedures for obtaining the optimum correction time T^* are described to minimize the expected cost per unit time. Numerical examples are given to illustrate the procedure. Author (GRA)

N79-12777# Syracuse Univ., N. Y.
BAYESIAN SOFTWARE PREDICTION MODELS. VOLUME 3: AVAILABILITY ANALYSIS OF SOFTWARE SYSTEMS UNDER IMPERFECT MAINTENANCE Final Technical Report, Dec. 1975 - Mar. 1978
K. Okumoto and Amrit L. Goel Griffiss Air Force Base, New York RADC Jul. 1978 46 p refs
(Contract F30602-76-C-0097; AF Proj. 5581)
(AD-A057872; TR-78-3; RADC-TR-78-155-Vol-3) Avail: NTIS HC A03/MF A01 CSCL 09/2

In this report a model for the operational phase of a software system is developed which incorporates the uncertainty of error removal and the time spent in correcting errors. Expressions for various measures of software system availability are derived. Numerical examples are used to illustrate these results. Author (GRA)

N79-12778# Stanford Univ., Calif. Electronics Labs.
THE FORMAL DEFINITION OF A REAL TIME LANGUAGE
John L. Hennessy and Richard B. Kieburtz (SUNY at Stony Brook, N. Y.) Jul. 1978 64 p refs
(Contract N00014-75-C-0601; Grant NSF JO-42203)
(AD-A058047; SU-SEL-78-024; SU-DSL-TR-155) Avail: NTIS HC A04/MF A01 CSCL 09/2

This paper presents the formal definition of TOMAL (Task-Oriented Microprocessor Applications Language), a programming language intended for real-time systems running on small processors. The formal definition addresses all aspects of the language. Because some modes of semantic definition

seem particularly well-suited to certain aspects of a language, and not as suitable for others, the formal definition employs several, complementary modes of definition. GRA

N79-12779# Naval Postgraduate School, Monterey, Calif.
A USER'S GUIDE FOR THE RITA PRODUCTION RULE SYSTEM M.S. Thesis
Thomas Early Warren Jun. 1978 143 p refs
(AD-A057901) Avail: NTIS HC A07/MF A01 CSCL 09/2

Interactive computer systems have traditionally communicated with the sophisticated computer user through a precise computer language. That language involved numerous control structures. Hardware costs and technology trends have excited a new breed of computer user. They, however, have lacked the sophistication and technical background to use most of the currently designed computer systems. In an attempt to meet the needs of the new breed of computer-naive user, The Rand Corporation has developed the Rule-directed Interactive Transaction Agent (RITA) system. RITA has used production systems and an English-like grammar to simplify program control structures and to communicate with the computer-naive user in a language of familiarity. A tutorial document has been developed to support the computer-naive user in using the RITA system. Author (GRA)

N79-12780# Massachusetts Inst. of Tech., Cambridge. Lab. for Computer Science.
SYNTHESIS OF SYNCHRONIZATION CODE FOR DATA ABSTRACTIONS Ph.D. Thesis
Mark Steven Laventhal 23 Jun. 1978 232 p refs
(Contract N00014-75-C-0661; Grant NSF DCR-74-21892)
(AD-A058232; MIT/LCS/TR-203) Avail: NTIS HC A11/MF A01 CSCL 09/2

Synchronization code is necessary to control shared access of an abstract data object in a parallel-processing environment. This thesis explores an approach in which a synchronization property can be specified in a high-level nonprocedural language, and an implementation for the specified property can be synthesized algorithmically. A problem specification language is introduced in which synchronization properties can be expressed in a structured but natural manner. A method is then presented for synthesizing an implementation. An intermediate form, called a solution specification, is first derived, representing an abstract solution to the problem. The derivation of the solution specification accomplishes the transformation of the specification from nonprocedural to procedural form. The solution specification can be translated directly into a source language synchronization mechanism, such as a monitor. Specifications for common synchronization properties, such as the readers-writers and bounded buffer problems, are expressed in the problem specification language. Corresponding implementations are then synthesized for these problems. In addition, the derived solution specification can be used in analyzing the soundness of the original problem specification with respect to criteria such as freedom from deadlock and starvation. Author (GRA)

N79-12781# Naval Postgraduate School, Monterey, Calif.
DESIGN OF SOFTWARE PACKAGE FOR INCORPORATION OF RANDOM LOAD TESTING AND DATA PROCESSING ON MATERIALS TESTING SYSTEM MACHINE M.S. Thesis
Frederick Martin Blakely, Jr. Jun. 1978 133 p refs
(AD-A057899) Avail: NTIS HC A07/MF A01 CSCL 01/3

This thesis describes the software design and implementation of a microprocessor-based, random load drive and data acquisition system on a Material Testing System (MTS) machine. A microprocessor, combination analog input/output module, magnetic cassette tape recorder, and strain gage network form a strain data acquisition system for recording sequential strain peaks and throughs on specimens subjected to flight load histories. The data will be used to estimate the fraction of the fatigue life expended in a test specimen. A high speed digital computer is linked by telephone line to a microcomputer development system to create the randomization of fatigue loads specified in Mil Spec 8866 Spectrum A for use by the MTS machine. Author (GRA)

N79-12782# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Computer Science.
THE IMPLEMENTATION AND EVALUATION OF A PARALLEL ALGORITHM ON C.MMP
P. N. Oleinick and S. H. Fuller 6 Jun. 1978 51 p refs
(Contract N00014-77-C-0500; F44620-73-C-0074)
(AD-A057875; CMU-CS-78-125) Avail: NTIS HC A04/MF A01 CSCL 09/2

The purpose of this paper is to get a detailed look at the performance of an implementation of a parallel program on C.mmp. The rootfinding algorithm was chosen because it meets two constraints: it is a parallel algorithm with significant interprocess communication; and it is of relatively low complexity, enabling one to focus on implementation issues rather than subtleties in the algorithm itself. Variations in processor speeds and asynchronously executing operating system functions are shown to have a detrimental effect on the rootfinder's performance. However, the most important implementation decision affecting the performance of the rootfinding program is the type of synchronization semaphore used. The threshold for practical application of a semaphore is defined here to be when 50% of the execution time is attributed to semaphore related overheads. Using the 50% criteria, thresholds were measured for inter-synchronization times from two milliseconds for the most primitive locks, to 200 milliseconds for the most sophisticated and flexible semaphore. During the course of these measurements, Hydra underwent several revisions and the 200 millisecond threshold was reduced to 33 milliseconds. The principal concept responsible for this performance improvement is discussed in the paper. GRA

N79-12783# Carnegie-Mellon Univ., Pittsburgh, Pa. Management Sciences Research Group.
LAGRANGE DUAL PROBLEMS WITH LINEAR CONSTRAINTS ON THE MULTIPLIERS
C. E. Blair and R. G. Jeroslow Jun. 1978 30 p refs
(Contract N00014-75-C-0621; Grant NSF GP-37510)
(AD-A057430; MSRR-419) Avail: NTIS HC A03/MF A01 CSCL 12/1

Consider Lagrange dual problems in which the vector of Lagrange multipliers, in addition to the usual nonnegativity conditions, satisfies certain linear constraints. Of course, the maximum dual value, for such restricted classes of multipliers, need not equal the primal value, even if various constraint qualifications are appended. Obtain expressions for this maximum constrained dual value, in terms of perturbation functions for the primal convex program, and value functions associated with the linear constraints. At least some information on the primal perturbation functions appears to be necessary in order to put upper or lower bounds on the constrained dual value. For the case that the constraints are, simply, that a positive weighted sum of the multipliers shall not exceed some given bound (plus, of course, the usual nonnegativities), only two values of an associated one-dimensional perturbation function is needed to obtain such upper and lower bounds. GRA

N79-12784# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A COMPUTER CODE TO ANALYZE ALPHA SPECTRA M.S. Thesis
Richard Steven Hartley Mar. 1978 91 p refs
(AD-A057433; AFIT/GNE/PH/78M-5) Avail: NTIS HC A05/MF A01 CSCL 14/2

A computer code was modified to analyze pulse-height spectra detected by semiconductor detectors. The program fit the spectra with a reference peak which was expressed as a table of values. The results of the analysis were dependent upon reference peak chosen; hence, reference peak selection became the main emphasis. The error resulting in each analysis was greater than three standard deviations of the actual area and was suspected to have occurred because of miscalculation of the reference peak. Author (GRA)

N79-12785# Syracuse Univ., N. Y.
BAYESIAN SOFTWARE PREDICTION MODELS, VOLUME 2: CLASSICAL AND BAYESIAN INFERENCE FOR THE SOFTWARE IMPERFECT DEBUGGING MODEL Final Technical Report, Dec. 1975 - Mar. 1978
K. Okumoto and Amrit L. Goel Jul. 1978 43 p refs
(Contract F30602-76-C-0097)

(AD-A057871; TR-78-2-Vol-2; RADC-TR-78-155-Vol-2) Avail: NTIS HC A03/MF A01 CSCL 09/2

This report presents two methods for statistical inference of the parameters of the imperfect debugging model proposed by Goel and Okumoto. Using the method of maximum likelihood, the mle's, the likelihood contours and the confidence regions for N, p and lambda are obtained. A Bayesian approach is presented to obtain the Bayesian point estimates and the H.P.D. regions. Numerical examples based on simulated data are used for illustrative purposes. Author (GRA)

N79-12786# Institute for Defense Analyses, Arlington, Va. Program Analysis Div.

A COMPUTER PROGRAM FOR SOLVING SEPARABLE NONCONVEX OPTIMIZATION PROBLEMS Final Report

Jeffrey H. Grotte, James E. Falk, and Paul F. McCoy Jan. 1978 104 p refs

(AD-A057755; AD-E500018; P-1318; IDA/HQ-77-19991) Avail: NTIS HC A06/MF A01 CSCL 12/1

The global optima of nonconvex optimization problems are, in general, impossible to find. Many such problems, however, can be approximated arbitrarily closely by separable problems wherein all functions are piecewise linear. Program MOGG is a FORTRAN code which will find a global optimum to these latter problems. The code is based on a branch and bound algorithm that is guaranteed to terminate after a finite number of steps. The code incorporates a linear programming subsystem designed to be numerically stable even for ill-conditioned problems.

Author (GRA)

N79-12787# Softech, Inc., Waltham, Mass.

SIMULATION HIGHER ORDER LANGUAGE REQUIREMENTS STUDY Final Report, 1 Feb. 1977 - 31 Jan. 1978

John B. Goodenough and Christine L. Braun Aug. 1978 228 p refs

(Contract F33615-77-C-0029)

(AD-A058994; AFHRL-TR-78-34) Avail: NTIS HC A11/MF A01 CSCL 09/2

This report defines high order language requirements for programming flight training simulators. These requirements were determined by analyzing programs written for a variety of simulators. Examples drawn from these programs are used to justify the need for certain HOL capabilities. A detailed specification of simulator HOL requirements is given, following the general structure and organization of the IRONMAN requirements for the DoD Common Language effort. PL/I, FORTRAN, JOVIAL J3B, JOVIAL J731, and PASCAL are analyzed to see how well each language satisfies the simulator HOL requirements. Although PL/I and JOVIAL J3B were found to be best suited for simulator programming, only FORTRAN was clearly the least suitable language. Since all the languages failed to satisfy some simulator requirements, modifications to each language were specified that would make them more useful as simulator programming languages. This analysis of recommended modifications indicated that PL/I was the most easily modified language. GRA

N79-12788# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Computer Science.

HEARSAY-2. TUTORIAL INTRODUCTION AND RETROSPECTIVE VIEW Interim Report

Lee D. Erman and Victor R. Lesser May 1978 49 p refs

(Contract F44620-73-C-0074; AF Proj. 2466)

(AD-A058870; CHU-CS-78-117; AFOSR-78-1246TR) Avail: NTIS HC A03/MF A01 CSCL 09/2

The Hearsay-2 system, developed at CMU as part of the five-year ARPA speech-understanding project, was successfully demonstrated at the end of that project in September 1976. This report reprints two Hearsay-2 papers which describe and discuss that version of the system' The 'Hearsay-2 System' A Tutorial:, and 'A Retrospective View of the Hearsay-2 Architecture'. The first paper presents a short introduction to the general Hearsay-2 structure and describes the September 1976 configuration of knowledge-sources; it includes a detailed description of an utterance being recognized. The second paper discusses the general Hearsay-2 architecture and some of the crucial problems encountered in applying that architecture to the problem of speech understanding. GRA

N79-12789# California Univ., Livermore. Lawrence Livermore Lab.

FORTRAN INTERFACE TO VECTOR PROGRAMMING

N. Maron and G. G. Sutherland 1 Jun. 1978 10 p

(Contract W-7405-eng-48)

(UCID-17477-Rev-1) Avail: NTIS HC A02/MF A01

With the advent of vector programming it becomes necessary to provide FORTRAN users a convenient method to utilize the vector capabilities of a computer in such a way that the impact is minimal to the user. Four simple-to-use subroutines called the FIVE package are proposed to accomplish this. DOE

N79-12790# National Technical Information Service, Springfield, Va.

AUTOMATIC PROGRAMMING. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - 1978

George W. Reimherr Sep. 1978 85 p Supersedes NTIS/PS-77/0823; NTIS/PS-76/0748; NTIS/PS-75/594

(NTIS/PS-78/0920/5; NTIS/PS-77/0823; NTIS/PS-76/0748; NTIS/PS-75/594) Avail: NTIS HC $28.00/MF $28.00 CSCL 09B

Principles and applications of automatic programming are cited in this bibliography of government-sponsored research reports. The programming languages used in automatic programming, techniques for debugging, and semantic models are included. This bibliography contains 78 abstracts. GRA

N79-12791# National Technical Information Service, Springfield, Va.

PROGRAMMING LANGUAGE DESIGN. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1970 - Aug. 1978

George W. Reimherr Sep. 1978 178 p Supersedes NTIS/PS-77/0864; NTIS/PS-76/0747; NTIS/PS-75/588

(NTIS/PS-78/0963/5; NTIS/PS-77/0864; NTIS/PS-76/0747; NTIS/PS-75/588) Avail: NTIS HC $28.00/MF $28.00 CSCL 09B

The bibliography cites research reports on the design, development, and implementation of programming languages. The citations include specifications and applications for the programming languages systems development, and their use in specific cases. Research on language compilers, syntax, semantics, and logic modules is included. This updated bibliography contains 172 abstracts, 17 of which are new entries to the previous edition. GRA

N79-12792# National Technical Information Service, Springfield, Va.

DATA BASE LANGUAGE. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Aug. 1978

George W. Reimherr Sep. 1978 109 p Supersedes NTIS/PS-77/0878

(NTIS/PS-78/0977/5; NTIS/PS-77/0878) Avail: NTIS HC $28.00/MF $28.00 CSCL 09B

The bibliography cites studies on query languages, data definition languages, data manipulation languages, and data element directories/dictionaries. References are made to the CODASYL standard, as well as to many other data bases. Descriptions of the data elements of data bases, applied to a variuty of areas, are given. GRA

N79-12793# General Accounting Office, Washington, D. C. Financial and General Management Studies Div.

NEW WAYS OF PREPARING DATA FOR COMPUTERS COULD SAVE MONEY AND TIME AND REDUCE ERRORS Report to the Congress

18 Jul. 1978 48 p refs

(PB-284286/2; FGMSD-78-39) Avail: NTIS HC A03/MF A01 CSCL 09B

Preparing data for processing by computers (data entry) was dominated by the keypunch and the punched card for years. Better methods now exist, and both large and small Government computer installations can benefit from adopting them. These benefits can include cost savings, increased productivity, better accuracy, and time saved. GAO found that agencies seldom make data entry studies either to determine potential or to determine results after buying new equipment. GRA

N79-12794# Stanford Univ., Calif. Stanford Artificial Intelligence Lab.
AL USERS' MANUAL
Shahid Mujtaba and Ron Goldman Nov. 1977 113 p refs (Grant NSF APR-74-01390-A04)
(PB-280719/6; NSF/RA-770481) Avail: NTIS HC A06/MF A01 CSCL 09B

The current state of the AL system now in operation at the Stanford Artificial Intelligence Laboratory (SAIL) is described, and instructions to users are provided. The AL system is geared toward batch manufacturing where setup time is a key factor. The AL programming system and the related hardware and software configuration at SAIL are described in an overview for the general reader. An example based tutorial is presented illustrating the use of simple AL instructions. The AL language and the complete set of currently implemented AL instructions are given. The execution of AL programs is described. POINTY, a system which allows the user to generate interactively the frame tree data structure for AL programs, is presented. Errors are described that might occur in the different stages of compiling and executing the AL program. GRA

N79-12113*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Communications Systems Research Section.
AN ITERATIVE ALGORITHM FOR DECODING BLOCK CODES TRANSMITTED OVER A MEMORYLESS CHANNEL
H. Greenberger *In its* The Deep Space Network 15 Oct. 1978 p 51-59 refs (For primary document see N79-12105 03-12)
Avail: NTIS HC A06/MF A01 CSCL 09B

N79-12716*# Los Alamos Scientific Lab., N. Mex.
A CORE + MODULES APPROACH TO FORTRAN STANDARDIZATION
Walt Brainerd *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 1-2 (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

N79-12718*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE IFIP WG 2.5 PROPOSALS ON FORTRAN
Charles L. Lawson *In its* Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 7-10 refs (For primary document see N79-12715 03-59)
(Contract NAS7-100)
Avail: NTIS HC A05/MF A01 CSCL 09B

N79-12719*# Bell Telephone Labs., Inc., Murray Hill, N. J.
ENVIRONMENT PARAMETERS AND BASIC FUNCTIONS FOR FLOATING-POINT COMPUTATION
W. S. Brown and S. I. Feldman *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 11-14 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

N79-12722*# Boeing Co., Seattle, Wash.
THE AUGMENT PRECOMPILER AS A TOOL FOR THE DEVELOPMENT OF SPECIAL PURPOSE ARITHMETIC PACKAGES
F. D. Crary and J. M. Yohe *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 23-26 refs Prepared in cooperation with Wisconsin Univ.-Madison (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

N79-12723*# Argonne National Lab., Ill. Applied Mathematics Div.
EXTENDING RELIABILITY: TRANSFORMATIONAL TAILORING OF ABSTRACT MATHEMATICAL SOFTWARE
James M. Boyle *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 27-30 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

N79-12724*# Softool Corp., Goleta, Calif.
FORTRAN TOOLS
Leon Presser *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 31-32 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

N79-12725*# Colorado Univ., Boulder. Dept. of Computer Science.
USING TOOLS FOR VERIFICATION, DOCUMENTATION AND TESTING
Leon J. Osterweil *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 33-37 refs (For primary document see N79-12715 03-59)
(Grant NSF MCS-77-02194)
Avail: NTIS HC A05/MF A01 CSCL 09B

N79-12726*# California Univ., Santa Barbara. Dept. of Mathematics.
A CASE FOR TOOLPACK
Webb Miller *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 38-40 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

N79-12727*# Argonne National Lab., Ill. Applied Mathematics Div.
PROGRAMMABLE FORMATTING OF PROGRAM TEXT: EXPERIENCES DRAWN FROM THE TAMPR SYSTEM
Kenneth W. Dritz *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 41-42 refs Sponsored by DOE (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

N79-12728*# Stanford Univ., Calif.
NEW LANGUAGES FOR NUMERICAL SOFTWARE
Eric Grosse *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 43-46 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

N79-12729*# Bell Telephone Labs., Inc., Murray Hill, N. J.
THE PROGRAMMING LANGUAGE EFL
S. I. Feldman *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 47-50 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

N79-12730*# Bell Telephone Labs., Inc., Murray Hill, N. J.
DESIGN PRINCIPLES OF THE PORT LIBRARY
Phyllis Fox *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 51-53 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

N79-12731*# International Mathematical and Statistical Library, Houston, Tex.
THE IMSL ENVIRONMENT FOR SOFTWARE DEVELOPMENT
T. J. Aird and D. G. Kainer *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 54-56 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

N79-12732*# Argonne National Lab., Ill. National Energy Software Center.
PORTABILITY AND THE NATIONAL ENERGY SOFTWARE CENTER
Margaret K. Butler *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 58-60 (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

N79-12733*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A TRANSPORTABLE SYSTEM FOR MANAGEMENT AND EXCHANGE OF PROGRAMS AND OTHER TEXT
W. V. Snyder *In its* Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 61-64 (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

N79-12734*# California Univ., San Diego, La Jolla. Inst. for Information Systems.
USING PASCAL FOR NUMERICAL ANALYSIS
Dennis Volper and Terrence C. Miller *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 64-66 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

N79-12736*# Purdue Univ., Lafayette, Ind. Mathematical Sciences Div.
PROGRAMMING EFFORT ANALYSIS OF THE ELLPACK LANGUAGE
John R. Rice *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 72-74 refs (For primary document see N79-12715 03-59)
(Grant NSF MCS-76-10225)
Avail: NTIS HC A05/MF A01 CSCL 09B

N79-12743*# Lockheed Electronics Co., Houston, Tex.
NOVA/IOPS - MDM/SIO - SL/BIU DATA TRANSFER TEST SOFTWARE GUIDE
In its Orbiter Multiplexer-Demultiplexer (MDM)/Space Lab Bus Interface Unit (SL/BIU) Serial Data Interface Evaluation, Vol. 2 May 1978 44 p (For primary document see N79-12741 03-60)
Avail: NTIS HC A06/MF A01 CSCL 09B

62 COMPUTER SYSTEMS

Includes computer networks.

N79-12795 New Hampshire Univ., Durham.
A SYSTEMS ANALYSIS OF A REAL-TIME MULTIPROCESSOR MINICOMPUTER SYSTEM Ph.D. Thesis
William Howard Lenharth 1978 207 p
Avail: Univ. Microfilms Order No. 7820463

The research is divided into two areas: computer system modeling and experimental testing. Two approaches are taken in the modeling area: analytical queueing and stochastic simulation. A queueing model formulation of the multiprocessor system under investigation is constructed. A series of previously developed and solved queueing models is discussed. The models progressively become more complex until the current state-of-the-art is reached. A Monte Carlo simulation model is developed which emulates the multiprocessor system. The data from the experimental program and from the modeling program is compared for systems of up to 3 processors. Different task types are also developed to improve the reliability of the validation results. The model and the experimental results show close correlation. Dissert. Abstr.

N79-12796# Naval Postgraduate School, Monterey, Calif.
COMPUTER NETWORKS. ANALYSIS AND A CASE STUDY DESIGN M.S. Thesis
Ivano deAzevedo Rocha Jun. 1978 221 p refs
(AD-A057906) Avail: NTIS HC A10/MF A01 CSCL 09/2

Computer networks are the outcome of the combination of computer and data communications technologies. Part 1 of this thesis presents the background of each one of these technologies and exposes analytically the principles of computer networking in particular. In Part 2, a preliminary design is developed for the Naval Postgraduate School (NPS) time sharing system. The study of Part 2 leads to a comparative analysis of four network architectures which are suitable for satisfying the needs of the NPS. Those architectures are compared in view of the desirable attributes of accessibility, evolvability, modularity, reliability and ease of operation. The communications requirements are derived and technologies for implementation of the communications links are recommended. Author (GRA)

N79-12721*# Bell Telephone Labs., Inc., Murray Hill, N. J.
UNIX AS AN ENVIRONMENT FOR PRODUCING NUMERICAL SOFTWARE
N. L. Schryer *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 18-22 refs (For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 09B

63 CYBERNETICS

Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support*.

N79-12797 Yale Univ., New Haven, Conn.
COMPARISON RESULTS FOR STOCHASTIC PROCESSES ARISING IN QUEUEING SYSTEMS Ph.D. Thesis
David Charles Sonderman 1978 72 p
Avail: Univ. Microfilms Order No. 7820803

Comparison theorems for stochastic processes and their applications in queueing theory are considered. Comparisons involve constructing two new processes on a common probability space so that the two new processes individually have the same distributions as the original processes, yet each sample path of one new process lies entirely below the corresponding sample path of the other new process. This special construction then implies strong stochastic comparisons for the original processes. After giving an overview of stochastic order concepts it is shown that recent comparison results for discrete-time stochastic processes and uniformizable continuous-time Markov chains can be extended to the class of regular CTMC's. Dissert. Abstr.

N79-12798 Duke Univ., Durham, N. C.
QUEUING MODELS FOR COMPUTER SYSTEM CONFIGURATION PLANNING Ph.D. Thesis
Robert Edward Kinicki 1978 217 p
Avail: Univ. Microfilms Order No. 7821314

Computer systems consisting of a central processor, main memory, and file-oriented secondary memories are modeled in terms of the two-stage cyclic queue model and the central server model. The configuration design problem solved is the maximization of system throughput as a function of device speeds subject to a nonlinear cost constraint. The Lagrange multiplier method is introduced to convert the optimization problem to a system of simultaneous nonlinear equations. A computer program is implemented to solve the system of equations using Brown's method. The results are compared against previous solutions and a proof is given to show that a unique global solution exists for the configuration design problem based on the central server model. Furthermore, the Lagrange multiplier method is shown to yield the global solution. Dissert. Abstr.

N79-12799 Virginia Polytechnic Inst. and State Univ., Blacksburg.
STOCHASTIC ADAPTIVE ESTIMATION WITH APPLICATIONS TO NONLINEAR CONTROL Ph.D. Thesis
Philip Edward Zwicke 1978 215 p
Avail: Univ. Microfilms Order No. 7820357

Two adaptive state estimators are developed, that are capable of tracking linear plants that undergo rapid configuration changes. The Partioned Adaptive Estimator (PAE) algorithm was derived for the problem of identifying which, of N, configurations that a linear plant is in; the key assumption being that the configuration is unknown but unchanging. The sliding window detector/estimator (SWDE) algorithm, is designed to solve the switched-linear plant problem. A joint detection/estimation approach to give a very close approximation to the unrealizable optimum switched-linear estimator is used. The application of the above estimators to the nonlinear estimation problem is presented. Dissert. Abstr.

N79-12800# Illinois Univ., Urbana-Champaign. Coordinated Science Lab.
COMPARISON SENSITIVITY DESIGN OF OUTPUT FEEDBACK SYSTEMS USING STATE OBSERVERS M.S. Thesis
Bruce Harvey Krough Jan. 1978 63 p refs
(Contract DAAB07-72-C-0259)
(AD-A057647; DC-9; UILU-ENG-78-2201) Avail: NTIS HC A04/MF A01 CSCL 09/4

A desirable property of any control design is that it be insensitive to small variations in the parameters of the controlled plant. This is necessary for several reasons. For instance, the

mathematical model can only approximate the physical problem so that the assumed values of parameters for the design may be different from the actual parameter values upon implementation. Also, most systems suffer from some forms of unmeasurable or unpredictable variations due to the degeneration of physical components and adverse environmental effects. Hence, there is a need for general design methods which guarantee some degree of insensitivity. In this thesis the reduction of sensitivity of feedback systems to parameter variations in the plant is investigated. The concept of comparison sensitivity is used as an indication of the sensitivity performance of a given design. In particular, the question of sensitivity reduction in feedback systems which use state observers for dynamic compensation is considered leading to a design procedure which guarantees sensitivity reduction with respect to a particular comparison sensitivity reduction criterion. The problem has been solved for the full state feedback case, and it was recently solved for the output feedback case using dynamic compensators. In both instances it is shown that sensitivity reduction is directly related to some optimal control law. A short overview of these past results is given in the sequel followed by a presentation of the results developed using state observers in the compensator dynamics. All systems discussed are assumed to be linear time invariant (LTI) systems which are state controllable and state observable. Author (GRA)

N79-12801# Illinois Univ. at Urbana-Champaign, Urbana. Decision and Control Lab.

ANALYSIS AND SYNTHESIS OF HIGH GAIN AND VARIABLE STRUCTURE FEEDBACK SYSTEMS Ph.D. Thesis

Kar-Keung David Young Nov. 1977 197 p refs

(Contract DAAB07-72-C-0259; Grant AF-AFOSR-2570-73)

(AD-A057462; DC-7) Avail: NTIS HC A09/MF A01 CSCL 09/3

This study deals with the analysis and synthesis of two classes of multivariable feedback systems, high gain feedback systems and variable structure systems (VSS), subject to parameter variations and disturbances. First, is examined the insensitivity property of high gain state feedback systems. The idea of incorporating high gain feedback loops in observers is then, introduced. Then the behavior of the resulting 'two-high-gain loops' system is studied. A design procedure which enhances the insensitivity of the closed loop system for the high gain feedback matrices is developed. Second, the relationship between high gain feedback systems and VSS is established. Third, the robustness property of these two classes of feedback systems with respect to model reduction is investigated. Finally, the insensitivity of these two classes of feedback control is used to enhance the reliability of interconnected systems. Design procedures of high gain feedback and variable structure controllers are illustrated in the designs for a distillation column, a synchronous machine and the longitudinal motions of an aircraft. GRA

N79-12802# Illinois Univ. at Urbana-Champaign, Urbana. Decision and Control Lab.

SINGULAR PERTURBATION OF NONLINEAR REGULATORS AND SYSTEMS WITH OSCILLATORY MODES Ph.D. Thesis

Joe Hong Chow Dec. 1977 123 p refs

(Contract DAAB07-72-C-0259; Grant AF-AFOSR-2570-73)

(AD-A057644; DC-8) Avail: NTIS HC A06/MF A01 CSCL 12/1

This report applies singular perturbation techniques to nonlinear optimal control problems and systems with high frequency oscillatory behavior. For a class of nonlinear regulator problems the Hamilton-Jacobi equation is solved as a power series expansion whose coefficients are solved from equations involving the slow variables only. Consequently, we obtain near-optimal feedback controls. Through the construction of a composite Lyapunov function, these controls can stabilize large disturbances of the fast variables. A fixed endpoint nonlinear control problem is decomposed into three lower order problems, namely, the nonlinear reduced order problem and the linear quadratic left and right boundary layer problems. For systems with high frequency oscillatory behavior, the original system is decomposed into a slowly varying system and a fast oscillatory system. This procedure provides physical interpretations for the high frequency oscillations occurring in a mass-spring-damper system and an interconnected power system. GRA

N79-12803# Illinois Univ. at Urbana-Champaign, Urbana. Decision and Control Lab.

NONCLASSICAL CONTROL PROBLEMS AND STACKELBERG GAMES

G. P. Papavassilopoulos and J. B. Cruz, Jr. May 1978 42 p refs Sponsored in part by DOE

(Contract DAAB07-72-C-0259; EX-76-C-01-2088; Grant NSF eng-74-20091)

(AD-A057649; DC-16) Avail: NTIS HC A03/MF A01 CSCL 12/1

Hierarchical and large scale systems have received considerable attention during the last few years; firstly, because of their importance in engineering, economics and other areas, and secondly, because of the increased capability of computer facilities. An important characteristic of many large scale systems is the presence of many decision makers with different and unusually conflicting goals. The existence of many decision makers who interact through the system and have different goals may be an inherent property of the system under consideration (e.x., a market situation), or may be simply the result of modeling the system as such (e.x., a large system decomposed to subsystems for calculation purposes). Differential games are useful in modeling and studying dynamic systems where more than one decision maker is involved. Most of the questions posed in the area of the classical control problem may be considered in a game situation, but their resultion is generally more difficult. In addition, many questions can be posed in a game framework, which are meaningless or trivial in a classical control problem framework. The superior conceptual wealth of game over control problems, which makes them potentially much more applicable, counterbalances the additional difficulties encountered in their solution. Author (GRA)

N79-12804# Yale Univ., New Haven, Conn. Systems and Information Sciences.

DIRECT AND INDIRECT ADAPTIVE CONTROL

Kumpati S. Narendra and Lena S. Valavani Apr. 1978 32 p refs

(Contract N00014-76-C-0017)

(AD-A058235; S/IS-7711) Avail: NTIS HC A03/MF A01 CSCL 12/1

The paper considers the control of an unknown linear time-invariant plant using Direct and Indirect Control. Using a specific controller structure and the concept of positive realness, adaptive laws which are identical are derived for the two cases. The stability questions that arise are also shown to be the same. Simulation results are presented towards the end of the paper to demonstrate the effectiveness of the new scheme proposed. Author (GRA)

N79-12805# Brown Univ., Providence, R. I. Div. of Applied Mathematics.

APPROXIMATION METHODS FOR THE MINIMUM AVERAGE COST PER UNIT TIME PROBLEM WITH A DIFFUSION MODEL Interim Report

Harold J. Kushner 1978 26 p refs

(Contract N00014-76-C-0279; Grants AF-AFOSR-3063-76; NSF ENG-73-03846; AF Proj. 2304)

(AD-A058876; AFOSR-78-1359TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

Approximation methods for the minimum average cost per unit time problem with a controlled diffusion model is treated. In order to work with a bounded state space, the reflecting diffusion model of Strook and Varadhan is used, although other models can also be treated. The control problem is approximated by an average cost per unit time problem for a Markov chain, and weak convergence methods are used to show convergence of the minimum costs to that for the optimal diffusion. The procedure is quite natural and allows the approximation of many interesting functionals of the optimal process. GRA

N79-12806# National Technical Information Service, Springfield, Va.

CONTROL THEORY, VOLUME 3. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, Aug. 1976 - Jul. 1978

George W. Reimherr Sep. 1978 268 p Supersedes NTIS/PS-77/0730; NTIS/PS-76/0636; NTIS/PS-75/504; COM-74-11433
(NTIS/PS-78/0925/4; NTIS/PS-77/0730; NTIS/PS-76/0636; NTIS/PS-75/504; COM-74-11433) Avail: NTIS HC $28.00/MF $28.00 CSCL 12A

Recent research reports are cited on automatic control, stochastic control, and feedback control, with multidisciplinary applications. Some of the applications include flight control, production control, and process control. This bibliography contains 261 abstracts. GRA

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N79-12807 Cincinnati Univ., Ohio.
BIASED ESTIMATION OF THE COMPLEX LINEAR MODEL WITH TIME SERIES APPLICATIONS Ph.D. Thesis
Charlotte Jahnke Outlaw 1978 72 p
Avail: Univ. Microfilms Order No. 7821586

Biased estimation techniques are developed for the complex linear model as a partial solution for the problems of near-dependencies among the independent or regressor variables. Three classes of estimators, each consisting of six types of estimators which have been developed for the real model, are defined. The estimator values for minimum MSE are found for each class of estimators for a class of measures which includes the Euclidean and design measures. The optimum values of the Euclidean MSE are compared for the three classes. Properties of the types of estimators are examined. A close look is made at the amount of bias introduced into the estimation and the direction of the parameter vector which yields minimum bias. Finally, the effect of ridge estimation on the amount of bias of the linear filter is examined. Dissert. Abstr.

N79-12808 North Carolina State Univ. at Raleigh
SOME ERGODIC THEOREMS AND ITERATIVE SOLUTIONS TO LINEAR EQUATIONS Ph.D. Thesis
Gordon Richard Feathers 1978 39 p
Avail: Univ. Microfilms Order No. 7820028

The iterative solution of certain linear functional equations in Banach spaces is studied. A matrix is used to generate a sequence, which under appropriate conditions, converges to a solution of a given linear functional equation. The matrix is generalized with respect to the entries, but strengthen the conditions on the operator. Both the generalization and the strengthening are contained. Dissert. Abstr.

N79-12809 Wesleyan Univ., Middletown, Conn.
NON-RECURRENT SEQUENCES WITH MINIMAL BLOCK GROWTH Ph.D. Thesis
David Steven Pelland 1978 90 p
Avail: Univ. Microfilms Order No. 7820176

Skew, i.e., non-recurrent, and Sturmian bisequences are described. A new method for constructing all such bisequences is included. For a general non-recurrent sequence with minimal block growth, the associated symbolic flow is presented, and these flows are shown to be isomorphic to the image under a sub-situation of constant length of the orbit-closure of a bisequence on two symbols with minimal block growth. Dissert. Abstr.

N79-12810 Stevens Inst. of Tech., Hoboken, N. J.
CORRECTING FOR THE INITIAL CONDITIONS IN A MULTI-TIME EXPANSION OF PERTURBED LINEAR DIFFERENTIAL EQUATIONS Ph.D. Thesis
Sylvester Leonard Tuohy 1978 102 p
Avail: Univ. Microfilms Order No. 7821637

The Reiss' remainder method is expanded for linear differential equations slightly disturbed by a term containing a small parameter epsilon. An estimate for the error in a one term approximation is obtained which is bounded by two terms, one depending on the differential equation and the other on the initial conditions. The method developed is applied to several examples. These include secular perturbation problems for ordinary and partial differential equations as well as a singular problem. Recurrence formula for the coefficients of the time scales in these examples are also included. An identity involving the integral of a Bessel's function and trigonometric functions, which resulted from the solution to the partial differential equation is given. Dissert. Abstr.

N79-12811 Arizona Univ., Tucson.
POSITIVE SOLUTIONS OF NONLINEAR DIFFERENTIAL EQUATIONS ON THE HALF LINE Ph.D. Thesis
Sushil Kumar Sachdev 1978 86 p
Avail: Univ. Microfilms Order No. 7821925

The positive solutions were considered for the nonlinear differential equation u'(t) + f(t,u(t)) = 0 on the interval (t sub 0, infinity), t sub 0 > or equal to 0, satisfying the initial condition u t sub 0 + bu' = c where b < or equal to 0 and c > or equal to 0. A monotonicity condition on f(t,w) was used to prove the uniqueness of the solution of the initial value problem. When f(t,w) > or equal to 0 (or < or equal to 0), uniqueness was also obtained under a sublinearity condition on f(t,w). The treatment of the problem was based on the application of various fixed point theorems. The lattice fixed point theorem and the Schauder-Tychonov fixed point theorem was used to give sufficient conditions for the existence of a positive solution of the initial value problem satisfying various conditions at infinity. Dissert. Abstr.

N79-12812 Stevens Inst. of Tech., Hoboken, N. J.
DEGREE SEQUENCES AND LINE GRAPHS Ph.D. Thesis
Douglas Ira Bauer 1978 90 p
Avail: Univ. Microfilms Order No. 7821611

Two problems in graph theory are considered. The first is to characterize those degree sequences which are realizable as a line graph. For graphs with p points and maximum degree d sub 1, solutions were found for the cases d sub 1 = p-1, d sub 1 = p-2, d sub 1 less than or equal 3, and for regular degree sequences. It is also shown that a line graphical degree sequence with d sub 1 = p-1 is uniquely line graphical. As a result, all but possibly one line graphical realization of an arbitrary degree sequence is shown to have one of four induced subgraphs. The second problem is to characterize those graphs each of which is isomorphic to an induced subgraph of its line graph. When this is the case the graph is said to be embedded in its line graph. One natural way to embed a graph into its line graph is via an incidence embedding in which the edge identified with a point is incident to it. A class of Hamiltonian graphs is determined for which incidence embeddings exist, and another class of Hamiltonian graphs for which only non-incidence embeddings exist. Dissert. Abstr.

N79-12813 Cincinnati Univ., Ohio.
DISCRETE TIME GALERKIN METHODS FOR PARABOLIC BOUNDARY VALUE PROBLEMS AND EXTRAPOLATION Ph.D. Thesis
Nozar Azarnia 1978 95 p
Avail: Univ. Microfilms Order No. 7821556

Single step Galerkin methods for the non-homogeneous parabolic initial-boundary value problem of Dirichlet type are studied. Two general theories, providing simple sufficient conditions on single step discrete time Galerkin methods, which lead to error estimates, are developed. Among the applications of these theories are methods which require satisfaction of the boundary conditions by the elements of the finite dimensional subspace of approximating functions, and others which make no such requirement. The use of Richardson extrapolation in conjunction with these single step discrete time Galerkin methods is investigated. It is shown that the extrapolation of the backward difference, or Crank-Nicolson, Galerkin approximations to a certain class of parabolic problems results in an improvement of 1, or 2, orders of accuracy in time, respectively, per extrapolation. Dissert. Abstr.

N79-12814 Brandeis Univ., Waltham, Mass.
ON THE INTRINSIC SYMBOL CALCULUS FOR PSEUDO-DIFFERENTIAL OPERATORS ON MANIFOLDS Ph.D. Thesis
Lance Douglas Drager 1978 204 p

Avail: Univ. Microfilms Order No. 7819936

The phase function naturally associated to a choice of connection on M was chosen. A symbolic calculus generalized the classical calculus of pseudo-differential operators on Euclidean space. The symbols were defined on the cotangent bundle of M, or its pull back to the product M x M. The asymptotic expansions of this calculus involved curvature coefficients and the covariant derivatives of the symbols with respect to connections naturally induced on the total space of the vector bundles where the symbols are defined. The necessary differential geometry was developed to carry out these computations and to compute the curvature coefficients recursively. Dissert. Abstr.

N79-12815 Yale Univ., New Haven, Conn.
CONJUGATE GRADIENT METHODS FOR PARTIAL DIFFERENTIAL EQUATIONS Ph.D. Thesis
Rati Chandra 1978 268 p
Avail: Univ. Microfilms Order No. 7819699

Variational iterative methods for solving symmetric linear systems are defined that include the conjugate gradient method as its simplest case. These gradient type methods minimize different error-functionals over subspaces of increasing dimension and possess attractive convergence properties. The general theory and computational aspects are developed and a few important special cases are discussed. Dissert. Abstr.

N79-12816 New York Univ., N. Y.
NONLINEAR STABILITY OF A TWO-DEGREE-OF-FREEDOM, NON-CONSERVATIVE, MECHANICAL SYSTEM Ph.D. Thesis
Leon Roque Sinay 1978 150 p
Avail: Univ. Microfilms Order No. 7824278

A mathematical model representing a mechanical system subjected to a follower force due to an interacting medium is studied. Examples of such mechanical systems include airfoils in an airstream, flexible pipes conveying fluid and nozzles of rockets. The physical structure of the system is represented by a double pendulum, flexural elastic properties are represented by linear torsional springs, and internal restorative forces are represented by linear extensional springs. The effect on the motion of the system that each one of these elements has, beginning with the simplest model in which only the torsional springs and the follower force are considered is analyzed. The system always has an equilibrium position in which both rods are collinear and vertically upward. Dissert. Abstr.

N79-12817 California Inst. of Tech., Pasadena.
PERIODIC SOLUTIONS OF INTEGRO-DIFFERENTIAL EQUATIONS WHICH ARISE IN POPULATION DYNAMICS Ph.D. Thesis
Henry Clark Simpson 1978 175 p
Avail: Univ. Microfilms Order No. 7823630

The problem of the existence and stability of periodic solutions of infinite lag, integro-differential equations was considered. Specifically, the integrals involved are the convolution type with the dependent variable being integrated over the range (infinity t), as occur in models of population growth. It is shown that Hopf bifurcation of periodic solutions from a steady state can occur, when a pair of eigenvalues crosses the imaginary axis. Also considered was the existence of traveling wave solutions of a model population equation allowing spatial diffusion in addition to the usual temporal variation. Lastly, the stability of the periodic solutions resulting from Hopf bifurcation was determined with aid of Floquet theory. Dissert. Abstr.

N79-12818 Iowa Univ., Iowa City.
MULTIPLIERS FOR SEGAL ALGEBRAS Ph.D. Thesis
Stanley Eric Seltzer 1978 45 p
Avail: Univ. Microfilms Order No. 7822448

Let S(G) be a Segal algebra in L1(G) where G is a locally compact Abelian group. A bounded linear operator T:L1(G)yields S(G) is called a multiplier in case T commutes with translations. The set of all multipliers from L1(G) into S(G) is characterized. Other results deal with the closed ideal theory of the multiplier algebra and with the more general problem of characterizing multipliers from one Segal problem to another. Dissert. Abstr.

N79-12819 Florida State Univ., Tallahassee.
FINITISTIC CONDITIONS ON THE GROUP OF DIVISIBILITY Ph.D. Thesis
Bruce Glastad 1978 40 p
Avail: Univ. Microfilms Order No. 7822168

Integral domains (with identity) having finitely generated groups of divisibility are presented. It is shown that such a domain has only finitely many prime ideals and that its integral closure is a Bezout domain which is in fact the intersection of a finite number of valuation overrings. Examples and counterexamples are given. Typical of these are the following: a local domain D whose group of divisibility is not finitely generated but whose integral closure is a Noetherian valuation ring and finite D-module; a non-integrally closed domain whose group of divisibility coincides with that of its integral closure; an integrally closed domain D contained in a domain J such that J is a finite D-module and G(D) is finitely generated but G(J) is not finitely generated. One of the main results is that the group of divisibility of a semi-local domain whose quotient field is a finite algebraic extension of either the rationals or an algebraic function field in one variable over a finite field is finitely generated. Dissert. Abstr.

N79-12820 California Univ., Davis.
FINITE DIFFERENCE SOLUTION OF THE DIFFUSION EQUATION ON COUPLED EULERIAN AND LAGRANGIAN GRIDS Ph.D. Thesis
Richard Bruce Hickman 1978 138 p
Avail: Univ. Microfilms Order No. 7822650

A diffusion equation modeling the flow of radiation was added to the hydrodynamic equations of two coupled Eulerian and Lagrangian finite difference computer codes. This permitted the extension of the range of problems to which these codes may be applied to include those in which temperatures on the order of a thousand electron volts were attained. The coupled codes were first order accurate shock hydrodynamics programs designed to calculate transient effects resulting from concentrations of high energy density. Such phenomena occurred when a projectile impacted a target or when a high explosive was detonated. When the energy density was very high, as when a nuclear explosive was fired or a laser fusion pellet was imploded, radiation energy became a significant portion of the total energy and must be accounted for. The diffusion approximation has proven to be a useful means of incorporating radiation physics in codes of this type. Dissert. Abstr.

N79-12821 Georgia Inst. of Tech., Atlanta.
INCREMENTAL HYBRID FINITE ELEMENT METHODS FOR FINITE DEFORMATION PROBLEMS (WITH SPECIAL EMPHASIS ON COMPLEMENTARY ENERGY PRINCIPLE) Ph.D. Thesis
Hidekazu Murakawa 1978 262 p
Avail: Univ. Microfilms Order No. 7823158

General (Hu-Washizu type) variational principles, in the total Lagrangean formulation, based on various measures of stresses and their conjugate strains are studied. With these general principles as the basis, various special forms of variational principles are derived. The possibility of constructing a stationary complementary energy principle for the finite deformation problem of elastic is examined. It is concluded, through this study, that only the general principle based on the Jaumann stress measure can lead to rational and practical complementary energy principle which involves, unlike in the linear theory, both the unsymmetric Piola-Lagrange stress and the rotation as variables. Through the results of the example problems, it is confirmed that the developed methods are powerful numerical tools to solve finite deformation problems of nonlinear elastic solids. These methods are also more efficient than those in the literature based on potential energy principles. Dissert. Abstr.

N79-12822# Naval Ship Research and Development Center, Bethesda, Md.
MULTIPLE LINEAR REGRESSION Final Report
G. R. Humfeld Aug. 1978 36 p refs
(AD-A057958; DTNSRDC-78/060) Avail: NTIS HC A03/MF A01 CSCL 12/1

Multiple linear regression theory provides an estimated covariance structure for the estimates of the parameters of the linear function based on given data. However, when the deviation

form is used to calculate these parameter estimates, the portions of this matrix which involve the constant term are generally missing. This report presents equations which can be used to calculate these missing covariances from quantities which are generally available. Most standard regression references discuss calculation of confidence limits for point estimates of the dependent variable when these point estimates are calculated from the regression equation. This report presents equations for similar limits for the independent variables, again from quantities generally available when a deviation-form routine is used. A different interpretation is suggested for these limits than is seen in the references. A numerical example is provided.

Author (GRA)

N79-12823# Arizona Univ., Tucson. Dept. of Mathematics.
ANALYTICAL AND NUMERICAL METHODS FOR NONLINEAR SINGULARLY-PERTURBED INITIAL VALUE PROBLEMS
R. E. Malley, Jr. and J. E. Flaherty (Rensselaer Polytech. Inst.) Sep. 1978 52 p refs
(Contract N00014-76-C-0326; Grant AF-AFOSR-2818-75)
(AD-A059279; TR-25) Avail: NTIS HC A04/MF A01 CSCL 12/1

This paper considers the vector problem when the m x m matrix f sub y(y,t,0) is singular of rank k, 0 < or = k < m, with k stable eigenvalues. Alternative analytical and numerical possibilities are explored, and analytical and numerical solutions are obtained for representative problems. GRA

N79-12824# National Technical Information Service, Springfield, Va.
APPLICATIONS OF THE FAST FOURIER TRANSFORM, VOLUME 1. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1970 - Aug. 1977
David W. Grooms Sep. 1978 328 p
(NTIS/PS-78/0931/2) Avail: NTIS HC $28.00/MF $28.00 CSCL 09D

Research reports are cited covering the use of the Fast Fourier Transform (FFT) in image processing, pattern recognition, parallel processing, voice communication, digital filtering, kalman filtering, seismic detection, radar tracking, and spectrum analysis. Comparisons of the FFT to other transforms such as, Walsh, Laplace, and the discrete Fourier are included. This updated bibliography contains 321 abstracts, none of which is new to the previous edition. GRA

N79-12825# National Technical Information Service, Springfield, Va.
APPLICATIONS OF THE FAST FOURIER TRANSFORM, VOLUME 2. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, Sep. 1977 - Aug. 1978
George W. Reimherr Sep. 1978 56 p Supersedes NTIS/PS-77/0830; NTIS/PS-76/0708; NTIS/PS-75/645; NTIS/PS-74/101 (NTIS/PS-78/0932/0; NTIS/PS-77/0830; NTIS/PS-76/0708; NTIS/PS-75/645; NTIS/PS-74/101) Avail: NTIS HC $28.00/MF $28.00 CSCL 09D

This bibliography cites research on the broad use of the Fast Fourier Transform (FFT) in signal processing. Some of the applications include image processing, pattern recognition, parallel processing, voice communication, digital filtering, kalman filtering, seismic detection, radar tracking, and spectrum analysis. Also included are brief comparisons of the FFT to some of the other transforms; i.e., Walsh, Laplace, and the discrete Fourier, that are used in processing signals. This updated bibliography contains 50 abstracts, all of which are new entries to the previous edition. GRA

N79-12826# National Technical Information Service, Springfield, Va.
INTEGRATION OF PARTIAL DIFFERENTIAL EQUATIONS. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1970 - Aug. 1978
George W. Reimherr Sep. 1978 180 p Supersedes NTIS/PS-77/0890; NTIS/PS-76/0791; NTIS/PS-75/702 (NTIS/PS-78/0981/7; NTIS/PS-77/0890) Avail: NTIS HC $28.00/MF $28.00 CSCL 12A

Numerical techniques presented include variational methods, finite difference theory, and asymptotic solutions. Research on computer computations of partial difference equations is included. This bibliography contains 174 abstracts. GRA

N79-12735*# Toronto Univ. (Ontario). Dept. of Computer Science.
DESIRABLE FLOATING-POINT ARITHMETIC AND ELEMENTARY FUNCTIONS FOR NUMERICAL COMPUTATION
T. E. Hull *In* JPL Conf. on the Programming Environ. for Develop. of Numerical Software 18 Oct. 1978 p 67-70 refs
(For primary document see N79-12715 03-59)
Avail: NTIS HC A05/MF A01 CSCL 12A

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N79-12827 Rochester Univ., N. Y.
CONSTRUCTION AND EVALUATION OF TESTS OF FIT: APPLICATIONS OF CHARACTERIZATIONS AND PROFILES OF DISTRIBUTIONS Ph.D. Thesis
Ching-Chuong Lin 1977 198 p
Avail: Univ. Microfilms Order No. 7818274

An investigation is made of the relevance and usefulness of the characterization properties of probability distributions for constructing goodness-of-fit tests, and of the profiles of distributions for evaluating the operating characteristics of the tests. In seeking new tests using the characterization properties, the focus is on various composite hypotheses. In proposing the new tests, in addition to considering their power properties, attention is also given to factors such as operational simplicity. The well-known goodness-of-fit tests for various simple and composite hypotheses in univariate and multivariate models and results pertaining to their comparisons are reviewed.

Dissert. Abstr.

N79-12828 Temple Univ., Philadelphia, Pa.
SOME DECISION THEORETIC MODELS IN CLINICAL TRIALS Ph.D. Thesis
David Chu Huang 1978 124 p
Avail: Univ. Microfilms Order No. 7817307

The robustness of the generalized Colton model and a proposed two-stage version of the model are studied. The generalized model is designed for a total of N patients who are to receive one of two competing treatments. These N patients are divided into three mutually exclusive sets of patients: non-experimental, experimental and post-experimental sets. The generalized model minimizes the ethical consequences of the decisions on all the N patients. The proposed two stage model is also compared with the generalized single stage model in terms of Bayes risk. Dissert. Abstr.

N79-12829 Cincinnati Univ., Ohio.
NONPARAMETRIC DISCRIMINANT ANALYSIS: A PROXIMATE ELEMENTS APPROACH Ph.D. Thesis
Michael Edward Dreskin 1977 151 p
Avail: Univ. Microfilms Order No. 7821204

A nonparametric discriminant technique that is preferable to the classical technique for some types of data is presented. An element of unknown origin into one of several possible populations is developed. To accomplish this discriminant analysis, it is necessary to obtain random samples from each of the populations. A cluster of elements from these samples is constructed around an element of unknown origin. The contents of the cluster are used as a basis for estimating from which population the unknown element originated. Guidelines are developed for determining when to use the nonparametric technique rather than the classical linear discriminant technique. Dissert. Abstr.

N79-12830 California Univ., Riverside.
MEASURES OF ASSOCIATION FOR CONTINGENCY TABLES WITH RANKED DATA Ph.D. Thesis
Lydia Paula Gans 1978 107 p
Avail: Univ. Microfilms Order No. 7821350

Goodman and Kruskal's gamma was compared to the measures tau, rho and rho-s with respect to its distributional

properties and general applicability to ordered contingency table data. The distribution of gamma, though asymptotically normal converges much more slowly and is considerably more uneven than the other measures. It often has very large tails so that inferences based on normality are inappropriate for small samples. It was also found that the mean of the small sample distribution of gamma gives an extremely biased estimate of the population value. Series expansion techniques reinforce these conclusions. The similarity between the distribution of rho and rho-s gives support to suggestions that were made by other researchers that different scoring systems do not greatly affect the value of the correlation coefficient. This leads to the conclusion that the use of rho can be justified in practice if not in theory.
Dissert. Abstr.

N79-12831 Columbia Univ. Teachers Coll., New York.
THE EFFECT OF MEASUREMENT ERROR ON THE POWER OF SOME STATISTICAL TESTS UNDER LINEAR STATISTICAL MODELS Ph.D. Thesis
Karl William Heiner 1978 115 p
Avail: Univ. Microfilms Order No. 7821275

The relationship between error of measurement and the power of the F test for the fixed effects general linear hypothesis is affected by test unreliability through the non-centrality parameter by multiplying it by the reliability coefficient. Some numerical examples of this relationship are presented in the form of graphs so that the results may be used to provide insight into this relationship in an instructional situation as well as in a research environment. The relative merits of increasing sample size and increasing instrument reliability are displayed in tables for the one way fixed effects analysis of variance. Dissert. Abstr.

N79-12832 Purdue Univ., Lafayette, Ind.
ON THE EXACT NON-HULL DISTRIBUTION OF WILKS' Lvc CRITERION FOR THE CLASSICAL AND COMPLEX NORMAL POPULATIONS AND RELATED PROBLEMS Ph.D. Thesis
Anita Jain 1978 132 p
Avail: Univ. Microfilms Order No. 7821459

The non-null distribution problem of Wilks' likelihood ratio criterion for testing the hypothesis of equality of variances and that of covariances in a p-variate classical normal population as well as in a complex normal population was studied. Powers were tabulated for five percent critical points for various values of the sample size N and small values of p. The percentage points were computed for various values of alpha-level, N and p. Dissert. Abstr.

N79-12833 Princeton Univ., N. J.
STOCHASTIC MECHANICS Ph.D. Thesis
David Samuel Shucker 1978 32 p
Avail: Univ. Microfilms Order No. 7823534

Stochastic mechanics is a theory that explains nonrelativistic quantum phenomena in terms of stochastic differential equations. The theory is consistent with Schrodinger's wave mechanics in its predictions. It is shown that in a system with zero potential, for almost every sample path alpha of the solution to the corresponding stochastic differential equation, a limit alpha(t):t exists. An example is also constructed to explain the theory of measurement in stochastic mechanics. Dissert. Abstr.

N79-12834 Florida State Univ., Tallahassee.
EMPIRICAL BAYES ESTIMATION OF TRANSITION PROBABILITIES FOR MARKOV CHAINS Ph.D. Thesis
Mohammad Reza Meshkani 1978 193 p
Avail: Univ. Microfilms Order No. 7822191

The empirical Bayes procedure for statistical decision making, in particular, the estimation of a parameter for a univariate distribution is reviewed. The theory to deal with the estimation of several parameters for a multivariate distribution is supplemented to provide an estimate for a vector or a matrix of probabilities in the following situations: (1) multinomial distribution; (2) stationary Markov chains; (3) nonstationary Markov chains; and (4) single stationary chain. Directions for future research are indicated. Dissert. Abstr.

N79-12835 Maryland Univ., College Park.
PROPERTIES OF MAXIMUM LIKELIHOOD ESTIMATORS FOR A CLASS OF PROBABILISTIC MODELS Ph.D. Thesis
Lee-Ann Collins Hayek 1978 115 p
Avail: Univ. Microfilms Order No. 7824015

A latent class model for the validation of a priori hierarchies is presented. Properties of the maximum likelihood estimators for the parameters involved are investigated. The model parameters involve the true or population proportion of respondents in given classes which serve as the elements of a latent parameter space. In addition, generalized misclassification parameters are estimated which are descriptive of the individual task probabilities that a subject will produce a response which is incompatible with the proposed hierarchy. The adequacy of the maximum likelihood procedure for small sample results in a situation where the number of parameters to be simultaneously estimated can increase as the number of variables is increased was studied. The method of solution described, termed the method of scoring, is based on the Taylor series expansion of a function of several variables, and is the multivariate analog of Newton's method of solving nonlinear equations by successively taking linear approximations. Dissert. Abstr.

N79-12836 California Inst. of Tech., Pasadena.
PROPAGATION OF THE FAST MAGNETOSONIC WAVE IN A TOKAMAK PLASMA Ph.D. Thesis
David Li-Shui Quek Hwang 1979 155 p
Avail: Univ. Microfilms Order No. 7824373

The experiments were focused on the understanding of the coupling between a loop antenna and a plasma-filled cavity. Special emphasis was given to the measurement of the complex loading impedance of the plasma. Once the complex loading impedance of the plasma is known, a matching network can be designed so that the r.f. generator impedance can be matched to one of the cavity modes, thus delivering maximum power to the plasma. The characteristics of the magnetosonic cavity modes are confirmed by three different methods. First, the cavity modes are observed as voltage maxima at the output of a six-turn receiving probe. Second, they also appear as maxima in the input resistance of the transmitting antenna. Finally, when the real and imaginary parts of the measured complex input impedance of the antenna are plotted in the complex impedance plane, the resulting curves are approximately circle, indicating a resonance phenomenon. Dissert. Abstr.

N79-12837# North Carolina Univ. at Chapel Hill. Dept. of Biostatistics.
NONPARAMETRIC STATISTICS AND RELIABILITY THEORY Final Progress Report, 1 Jun. 1974 - 30 Jun. 1978
Pranab Kumar Sen 1978 7 p refs
(Grant AF-AFOSR-2736-74)
(AD-A057303; AFOSR-78-1202TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The principal investigator was mainly interested in the development of various invariance principles for various parametric as well as nonparametric statistics and in their applications to problems in sequential analysis arising in clinical trials and reliability theory. Especial attention was paid to the development of nonparametric testing under progressive censoring and their applications. Thirty-nine papers have been published under this grant. GRA

N79-12838# Johns Hopkins Univ., Baltimore, Md. Dept. of Mathematical Sciences.
STATISTICAL METHODS IN SEARCH
Thomas L. Corwin Jun. 1978 48 p refs
(Contract N00014-77-C-0511)
(AD-A058031; TR-302) Avail: NTIS HC A03/MF A01 CSCL 12/1

This work consists of the development of a number of statistical techniques useful in solving search problems. Among these are the employment of Bayesian, minimax, and maximum likelihood inferential techniques in the estimation of the position of a moving target during a search. An application of potential theory to search problems is also considered. GRA

N79-12839# Michigan Univ., Ann Arbor. Cooley Electronics Lab.
SPECTRAL ESTIMATION OF ALL-POLE PROCESSES USING BAYESIAN TECHNIQUES
R. J. Carpinella Jun. 1978 230 p refs

(Contract N00014-75-C-0175)
(AD-A059065; CEL-TR-230) Avail: NTIS HC A11/MF A01 CSCL 17/2

The problem considered is the spectral estimation of Mth order stationary Gaussian processes which possess an all-pole spectral representation. This spectral estimate is determined through the application of Bayes Rule, to find the post probability density functions. The problem is cast as a Bayesian parameter estimation problem. The use of a finite dimensional set of sufficient statistics facilitates the problem solution. The solutions presented are limited to the M-1, and M-2 case, but these results can be extended to higher order finite dimensional processes. Because the M-2 problem exhibits the characteristics of higher dimensional processes, the emphasis of the simulation study is placed here. The main concern in the simulation study is the use of the simple measurements described by the sufficient statistics, to develop the final estimate, and the circumstances under which this approach can be used. GRA

N79-12840# Purdue Univ., Lafayette, Ind. Dept. of Statistics.
PROBABILITY AND STATISTICS AND APPLICATIONS Annual Technical Report, 1 Jun. 1977 - 31 May 1978
Leon Jay Gleser and David S. Moore 21 Jul. 1978 10 p refs
(Grant AF-AFOSR-3291-77)
(AD-A059272; AFOSR-78-1338TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This annual report reviews work by Drs. Leon Jay Gleser and David S. Moore and various students, on the following topics: minimax estimation of the mean vectors of multivariate normal distributions with unknown covariance matrix; minimax and computational stability properties of generalized ridge regression estimators of regression coefficients in the classical linear model; Bayes multiple comparison procedures in two-factor ANOVA designs; calculation and properties of point and interval estimates of slope parameters in multivariate errors-in-variables regression models (linear functional equations); Bahadur exact slopes of intersection-union and union-intersection tests; asymptotic pointwise optimal and asymptotically optimal sequential Bayes regional estimators for all of, or functions of, a vector parameter; chi-squared goodness-of-fit tests for censored data; chi-squared goodness-of-fit tests for multivariate normality; and the general theory and application of chi-squared tests. A bibliography of publications and reports is provided. Author (GRA)

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N79-12841 California Univ., Los Angeles.
EIGENSTRUCTURE ASSIGNMENT IN LINEAR TIME INVARIANT SYSTEMS Ph.D. Thesis
Derek Evan Iverson 1978 198 p
Avail: Univ. Microfilms Order No. 7820233

The only intrinsic limitations on the spectrum obtainable thru lsvf are those imposed by the fundamental theorem of linear state variable feedback which relates the controllability indices of the controllable pair (A,B) to the degrees of the invariant polynomials of (A+BK). Controlling the properties of (A+BK) are the eigenvectors of (A+BK). Thus, the most general design algorithm specifies the total eigenstructure of the closed loop system. A dual algorithm is developed to handle eigenstructure assignment of the matrix (A+KH) arising from the design of linear observers or from the design of linear systems thru the use of periodic output feedback. Dissert. Abstr.

N79-12842 California Univ., Los Angeles.
APPLICATION OF SINGULAR PERTURBATION TO DETERMINISTIC AND STOCHASTIC SYSTEMS WITH AND WITHOUT TIME DELAY Ph.D. Thesis
Kapriel Varujan Krikorian 1978 107 p
Avail: Univ. Microfilms Order No. 7820241

Singular perturbation methods are applied to various optimal control and stochastic linear estimation problems to produce order reduction and thus simplify the analysis of systems with and without small time delays. Numerical techniques are developed to obtain the optimally sensitive design of systems with slow and fast modes which may involve small time delays. The minimum fuel problem is solved for linear time invariant systems using separation of time scales. A near optimum control is composed of two controls, slow and fast, obtained in different time scales. Dynamic programming in conjunction with singular perturbations is studied for linear systems, and near optimum control of system with slow and fast states is obtained. This control also consists of two control functions obtained separately. Singular perturbation methods are then applied to systems with stochastic variables. Discrete Kalman and Wiener filtering by singular perturbations are discussed for continuous systems with stochastic state sampled at small intervals. Examples are given to illustrate the issues discussed. Dissert. Abstr.

N79-12843# California Univ., Berkeley. Operations Research Center.
OPTIMAL TESTING PROCEDURES FOR COHERENT SYSTEMS
Yosi Ben-Dov Sep. 1977 26 p refs
(Contract N00014-75-C-0781; Grant AF-AFOSR-3179-77; AF Proj. 2304)
(AD-A057952; ORC-77-23) Avail: NTIS HC A03/MF A01 CSCL 12/2

This report deals with the problem of minimizing the expected cost of testing a coherent system. The concept of the Importance of Components is used to develop a branch and bound algorithm which determines the optimal testing policy for any coherent system. GRA

N79-12844# Army Electronics Research and Development Command, Adelphi, Md.
REMBASS SPECIAL PROCESSING UNIT
Gregory J. Unangst Apr. 1978 24 p
(AD-A057605) Avail: NTIS HC A02/MF A01 CSCL 15/4

The REMBASS Special Processing Unit (SPU) is envisioned as a small computer display system which will assist the operator of a sensor system to plan, manage, monitor and analyze the inputs from a deployed sensor system. The primary purpose of this effort has been and will be to define the operational functions of the SPU. Also this effort will attempt to recommend algorithm development, to determine a reasonable size for the system, and to propose possible display configurations. GRA

N79-12845# Army Electronics Research and Development Command, Adelphi, Md.
REMBASS AIRBORNE REPEATER/PLATFORM ANALYSIS
Robert F. Perricelli and James V. OBrien Apr. 1978 109 p refs
(AD-A057608) Avail: NTIS HC A06/MF A01 CSCL 15/4

The Systems Analysis Office was tasked to analyze the alternatives available for an airborne REMBASS relay. The specifics of the analysis were to address the general design philosophy of the repeater, and the viability and acceptability of possible airborne platform candidates. Regarding the relative performance of the major candidate platform types (manned aircraft, tethered aerostats, or Mini RPVs), it was determined that a compatible, non-dedicated, manned aircraft (such as the SLAR OV-1D) would be the most cost effective alternative. Further, should the use of a manned aircraft prove unacceptable, then the use of a system of tethered aerostats was determined to be preferable to one employing Mini RPVs. Based on the system communication channel requirements and the available payload/space limitations, it was concluded that any airborne repeater design eventually produced should be of a multi-channel configuration, and should employ a higher level of technology (electronic miniaturization) than currently employed in the REMBASS single channel repeaters. GRA

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N79-12846 American Univ., Washington, D. C.
CERTAIN MATRIX CONGRUENCES OVER RINGS OF INTEGERS Ph.D. Thesis
Norma Jeanne Hibbs 1978 82 p
Avail: Univ. Microfilms Order No. 7819975

Some congruence theorems for integer matrices are discussed which are similar to classical number theory theorems for integers. Several theorems reminiscent of the little Fermat theorem are shown. Also, the order of a matrix over Z sub p is examined and the number of matrices satisfying certain congruences is evaluated. Dissert. Abstr.

N79-12847 Michigan Univ., Ann Arbor.
EXISTENCE THEOREMS FOR OPTIMAL CONTROL PROBLEMS IN BANACH SPACES Ph.D. Thesis
Shui-Hung Hou 1978 162 p
Avail: Univ. Microfilms Order No. 7822919

The existence of admissible pairs (x,u) is considered for optimal control problems monitored by operational equation of the form Ex=N sub u x where E is a linear, not necessarily bounded, operator and N sub u is a nonlinear operator depending on control variable u, and both are defined on subsets of a suitably chosen Banach space. The cost functional was either a Mayer type functional I(x), or a Lagrange type functional I(x,u) defined by an integral on the time interval. Properties of multifunctions and measurable selection theorems are elaborated which are relevant to the study of the control problems under consideration. Dissert. Abstr.

N79-12848 Princeton Univ., N. J.
A LOCAL VERSION OF REAL HARDY SPACES Ph.D. Thesis
David Marc Goldberg 1978 29 p
Avail: Univ. Microfilms Order No. 7823521

A local Hardy space h sup p which has the qualitative properties of the H sup p theory, but none of its awkward problems at infinity was studied. Because there is a close connection between the two theories, techniques can sometimes be used to prove H sup p theorems. As an example, de Leeuw's theorem on the restriction of multipliers is extended to H sup 1. A link between H sup 1 and h sup 1 is provided by a Kelvin transform. The proof involves a refinement of the atomic decomposition for H sup 1. Dissert. Abstr.

N79-12849 Maryland Univ., College Park.
CONVERGENCE ON A FILTER AND ASSOCIATED SET FUNCTIONS Ph.D. Thesis
Paul Francis Creegan, Jr. 1978 91 p
Avail: Univ. Microfilms Order No. 7823992

Linear spaces of functions were frequently employed as models of a physical situation. In many instances certain set functions, defined on subsets of the common domain of the functions in the linear space, played an important role in analyzing the structure of that linear space. The classical capacities of potential theory were basic examples of such a situation. A class of set functions, called size functions was introduced which was defined on subsets of a linear space. The basic properties of size functions were analyzed, and showed that they were naturally connected with a universally applicable approach to generating all locally convex topologies on linear spaces of scalar-valued functions. Dissert. Abstr.

N79-12850# California Univ., Berkeley. Electronics Research Lab.
A PROGRAM TO SWAP DIAGONAL BLOCKS
B. N. Parlett 3 Nov. 1977 32 p
(Contract N00014-76-C-0013)
(AD-A057998; UCB/ERL-M77/66) Avail: NTIS HC A03/MF A01 CSCL 12/1

A triangular matrix reveals its eigenvalues on the main diagonal. By Schur's lemma any square matrix is unitarily similar to an upper triangular matrix with the eigenvalues arranged in any desired order along the diagonal. In practice the QR algorithm in real arithmetic produces a block triangular matrix in which the eigenvalues are likely to be in monotone decreasing order by absolute value down the diagonal. However, this monotonicity cannot be guaranteed and for some purposes the ordering by absolute value is not what is wanted. The problem which we address here is to find some simple orthogonal similarity transformations which have the effect of exchanging two diagonal elements (or blocks) while preserving block triangular form. Actually we will show only how to swap adjacent blocks and so the exchange of distant blocks must be accomplished by a succession of adjacent swaps. GRA

N79-12851# Naval Research Lab., Washington, D. C.
THE CONDITIONAL PROBABILITY OF RANDOM HARMONIC SETS Interim Report
David A. Swick Jun. 1978 17 p refs
(XF111214000)
(AD-A058247; AD-E000192; NRL-MR-3794) Avail: NTIS HC A02/MF A01 CSCL 12/1

The approximate conditional probability that m random variables out of a set of n uniformly and independently distributed on (a,b) are integral multiples of a fundamental to within a tolerance of 100t%, given that the fundamental is an integral divisor of the smallest of the m to within the same tolerance has been calculated. The algorithm has been implemented in an efficient FORTRAN subroutine. Author (GRA)

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N79-12852 Cornell Univ., Ithaca, N. Y.
AN APPLICATION OF THE CALCULUS OF VARIATIONS TO THE EXISTENCE AND BIFURCATION OF PERIODIC MOTIONS IN A CLASS OF NONLINEAR DYNAMICAL SYSTEMS Ph.D. Thesis
Timothy Lee Johnson 1978 183 p
Avail: Univ. Microfilms Order No. 7817762

Motions which pass through points of maximum potential energy (zero kinetic energy) and maximum kinetic energy (zero potential energy) were called nonlinear normal models. The class of modes which provide Jacobi's Principle of Least Action with a true minimum are considered in this work. They are defined as minimal normal modes (MNM's). Normal modes for a linear system are a special case of MNM's. Interest in studying MNM's can arise in an engineering context due to their connection with resonance phenomena. Conditions for the nongeneraic case, where and odd number of modes occur, are used to show the way in which MNM's bifurcate. The location of MNM's is also considered. A set of sufficient conditions is presented which can be used to locate a MNM in a region defined by two test curves. These conditions are applied to a class of two mass-three spring systems. Dissert. Abstr.

N79-12512# Observatoire de Paris (France). Lab. Primaire du Temps et des Frequences.
APPLICATION OF SPACE TECHNIQUES TO TIME AND FREQUENCY DISSEMINATION AND SYNCHRONIZATION
J. Rutman *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 311-316 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12513# Bureau International de l'Heure, Paris (France).
THE LINKS BETWEEN THE TIME SCALES
Michel Granveaud *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 317-319 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12514# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
SPACELAB EXPERIMENTS WITH ATOMIC CLOCKS
S. Starker *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 321-322 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12515# Istituto Elettrotecnico Nazionale (Galileo Ferraris), Turin (Italy).
SIRIO 1 TIMING EXPERIMENT
E. Detoma, S. Leschiutta, and G. Rovera *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 323-324 (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

71 ACOUSTICS

Includes sound generation, transmission and attenuation.

For noise pollution see *45 Environment Pollution*.

N79-12853 Yale Univ., New Haven, Conn.
THE VELOCITY OF SOUND IN SUPERCOOLED AND SUPERHEATED WATER Ph.D. Thesis
Eugene H. C. Trinh 1978 227 p
Avail: Univ. Microfilms Order No. 7820807

Following a summary of a few of the properties of normal and metastable liquid water, and a brief review of some of the theoretical models for the structure of water, an experiment using the properties of light diffraction by ultrasonic waves for the determination of the sound speed in metastable liquids is described. Results obtained in supercooled water down to -16.75 C and in superheated water up to 176.5 C are reported. Some evidence for an inflection point at around -11 C is found in the second speed versus temperature curve. An attempt to interpret the anomalous properties of supercooled water is made through a two-state model. Dissert. Abstr.

N79-12854 Cincinnati Univ., Ohio.
THE TOTAL ACOUSTIC POWER RADIATED FROM TURBULENT, COMPRESSIBLE SELF GRAVITATING FLUID Ph.D. Thesis
Richard Lawrence Hatfield 1978 204 p
Avail: Univ. Microfilms Order No. 7821571

Beginning with a simple retarded Greens function, an expression for the density waves arising from the turbulent region is obtained. The power is then calculated in terms of two point, sixth and fourth order correlation functions of the fields. Using the assumption that the turbulent fluid is inviscid, stationary, homogeneous, and isotropic, and that the fields are described by a Gaussian distribution function, a closed form for the power is developed. The presence of the self-gravitational terms demand that the fluid be treated as compressible. A final integration yields an expression for the power in terms of scale lengths and velocities, which are determined by the physical arrangement. The expression of the power radiated is of particular importance within the context of the cosmic turbulence theory for the formation of galaxies. Dissert. Abstr.

N79-12855 Purdue Univ., Lafayette, Ind.
THE APPLICATION OF COHERENCE FUNCTION TECHNIQUES FOR NOISE SOURCE IDENTIFICATION Ph.D. Thesis
Mun En Wang 1978 321 p
Avail: Univ. Microfilms Order No. 7821515

Two different but related approaches were studied. The concept of the frequency response function and the coherent residual spectral density function were employed. In both approaches the noise generation system with multiple noise sources was modelled as a multiple-input, linear, time-invariant system. The inputs of the model were the noise signals measured by microphones placed close to the selected noise sources. The output was the noise measured by a remote microphone. To gain physical insight into coherence techniques, an experiment was conducted with an idealized system. Dissert. Abstr.

N79-12856 Stanford Univ., Calif.
ACOUSTIC REFLECTION MICROSCOPE Ph.D. Thesis
Abdullah Atalar 1978 170 p
Avail: Univ. Microfilms Order No. 7822475

A visual reflection image of a sample is produced with this instrument by mechanically scanning that sample at the waist of a sharply focused acoustic beam. This highly covergent beam is obtained by an acoustic lens which is free from spherical aberrations. The performance of the imaging system is limited by diffraction, and a resolution of one micron is demonstrated. When smooth surfaces of crystalline material immersed in a liquid are illuminated with a highly convergent acoustic beam, the reflected field is perturbed in a unique way controlled by the elastic parameters of the solid surface. If this field is received by a phase sensitive transducer, it results in a distant response that is determined by recording the output of the transducer as the spacing between the acoustic lens and the object is varied. The output plotted as a function of this spacing produces a signature which differs from material to material. Dissert. Abstr.

N79-12857*# Bolt, Beranek, and Newman, Inc., Canoga Park, Calif.
EVALUATION OF AERO COMMANDER PROPELLER ACOUSTIC DATA: STATIC OPERATIONS
A. G. Piersol, E. G. Wilby, and J. F. Wilby May 1978 104 p refs
(Contract NAS1-14611)
(NASA-CR-158919) Avail: NTIS HC A06/MF A01 CSCL 20A

Acoustic data are analyzed from a series of ground tests performed on an Aero Commander propeller-driven aircraft with an array of microphones flush-mounted on one side of the fuselage. The analyses were concerned with the propeller blade passage noise during static operation at several different engine speeds and included calculations of the magnitude and phase of the blade passage tones, the amplitude stability of the tones, and the spatial phase and coherence of the tones. The results indicate that the pressure field impinging on the fuselage represents primarily aerodynamic (near field) effects in the plane of the propeller at all frequencies. Forward and aft of the propeller plane aerodynamic effects still dominate the pressure field at frequencies below 200 Hz; but at higher frequencies, the pressure field is due to acoustic propagation from an equivalent center located about 0.15 to 0.30 blade diameters inboard from the propeller hub. Author

N79-12858# Illinois Univ. at Urbana-Champaign, Urbana. Coordinated Science Lab.
DESIGN OF SAW FILTERS WITH DIFFRACTION COMPENSATION M.S. Thesis
Supriyo Datta Feb. 1978 81 p refs
(Contracts DAAB07-72-C-0259; F33615-75-C-1291)
(AD-A057642; R-809; UILU-ENG-78-2202) Avail: NTIS HC A05/MF A01 CSCL 09/3

Surface Acoustic Wave (SAW) devices provide a convenient hardware implementation for non-recursive transversal filters. Because of their low-cost and small size, SAW filters are becoming increasingly popular in various signal processing applications. Author (GRA)

N79-12859# Dayton Univ., Ohio. School of Engineering.
SOUND TRANSMISSION THROUGH DUCTS Final Technical Report, 8 Feb. 1974 - 31 Sep. 1977
John J. Schauer, Eugene P. Hoffman, and Robert W. Guyton Wright-Patterson AFB, Ohio AFAPL May 1978 161 p refs
(Contract F33615-74-C-2030)
(AD-A057803; UDSE-TR-78-03; AFAPL-TR-78-25) Avail: NTIS HC A08/MF A01 CSCL 20/1

This report covers analytic studies describing the propagation of sound waves in acoustically lined ducts. These ducts are typically found in quieted high bypass turbine engine nacelles. FORTRAN IV computer programs were written for a CDC 6600 computer to predict maximum exponential attenuation of a least naturally attenuated mode in rectangular, angular, and cylindrical ducts either uniform or sheared flow. Additional programs were written to design optimum perforated plate liners. GRA

N79-12860# TRW Defense and Space Systems Group, Redondo Beach, Calif.
SAW OSCILLATOR INVESTIGATIONS. CRYSTAL ROTATION SAW OSCILLATOR AGING Final Report, Apr. 1977 - Jan. 1978
Oct. 1978 57 p
(Contract N66001-77-C-0088)

(AD-A057463) Avail: NTIS HC A04/MF A01 CSCL 20/1

This final report describes the results of two surface acoustic wave oscillator studies. The first study demonstrated a new technique for varying the frequency of operation of SAW delay lines. The second study continued the ongoing aging test of four 250 MHz oscillators which was started in July 1975, and measured the aging rate of a new pair of oscillators fabricated using SAW delay lines with chrome/gold metallization. Future high performance communication systems will require frequency sources at UHF and microwave frequencies. SAW oscillators offer several advantages over bulk crystal oscillator multiplier chain type sources. The higher fundamental frequency capability of the SAW device eliminates the need for a multiplier chain, thus reducing size, weight, and power while providing superior phase noise characteristics. GRA

N79-12861# TRW Defense and Space Systems Group, Redondo Beach, Calif.

FEASIBILITY DEMONSTRATION OF FIBER OPTIC DETECTION OF LOW FREQUENCY SOUND, PHASE 2

James H. Cole, Robert L. Johnson, and Pravin G. Bhuta 31 Jul. 1978 35 p refs

(Contract N00014-76-C-0490)

(AD-A059241; AT-ATD-TR-78-3) Avail: NTIS HC A03/MF A01 CSCL 17/1

A scale-up of the single sensor interferometer previously employed was completed. The expected improvement in acoustic sensitivity was not obtained. Experiments were performed to demonstrate that system noise would not allow attainment of the theoretical sensitivity threshold. Alternate differential interferometer configurations demonstrated reduced system noise and acoustic detection from 100 Hz to 1 KHz was achieved. Author (GRA)

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N79-12862 Stevens Inst. of Tech., Hoboken, N. J.

INELASTIC SCATTERING OF ELECTRONS BY SINGLY-IONIZED BARIUM AND SOME CONSIDERATIONS RELEVANT TO THE GENERAL ELECTRON-ION SCATTERING PROBLEM Ph.D. Thesis

Arthur Dodd Bates 1978 152 p

Avail: Univ. Microfilms Order No. 7821610

Total inelastic scattering cross sections were determined near threshold, for several transitions induced by electron e(-) impact on singly-ionized Barium. Specific results are presented for the 6S-6P, 6S-5D, and 5D-6P transitions in the Coulomb Born approximation and the Distorted Wave. Numerical difficulties are discussed in the application of the more accurate closecoupling approximation. Two methods which take advantage of the special properties of the Chebyshev polynomials were used to compute the solutions to a system of two coupled second order differential equations which are similar in structure to those which arise in the close-coupling approximation. Dissert. Abstr.

N79-12863 Brandeis Univ., Waltham, Mass.

POSITRON AND POSITRONIUM LIFETIMES IN THE HELIUM GASES Ph.D. Thesis

Marvin Fishbein 1978 135 p

Avail: Univ. Microfilms Order No. 7819937

Lifetime spectra for positrons in the helium gases were measured at low temperatures using delayed coincidence techniques. Measurements were taken in He4 over temperatures 4-6 K and densities 39-475 amagat and in He3 over 3-6K and 45-424 amagat. Experimental and theoretical investigation of the clustering of helium atoms about single positrons are presented. The He4-He3 comparison provides support for the Atkins model as a basis for understanding the clustering. Experimental and theoretical investigation of cavity formation about single positronium atoms are presented. Dissert. Abstr.

N79-12864 Yale Univ., New Haven, Conn.

ELECTRON CAPTURE COLLISIONS OF HYDROGEN ATOMS WITH HIGHLY CHARGED IONS AND HIGH ENERGY PROTONS Ph.D. Thesis

Larry David Gardner 1977 247 p

Avail: Univ. Microfilms Order No. 7818699

Electron capture was experimentally studied for beams of multiply charged ions as well as high energy protons passing through atomic hydrogen and other gas targets. Beams of boron, carbon, nitrogen, and oxygen ions were formed having electrical-charge values from two to six units and having tens of kiloelectron volt energies. Single electron capture cross sections were determined for these beams passing through atomic hydrogen, molecular hydrogen, helium, and argon. Single electron capture cross sections were also determined for iron ions. Electron capture by protons passing through atomic hydrogen, molecular hydrogen, and argon was studied for incident proton energies in the low million volt range. Dissert. Abstr.

N79-12865 Oregon State Univ., Corvallis.

DECAY OF ATOMIC STATES STRONGLY COUPLED BY AN OSCILLATING FIELD Ph.D. Thesis

William Graham Greenwood 1978 210 p

Avail: Univ. Microfilms Order No. 7821386

Frequency distributions were calculated for the optical decay of two atomic states which were coupled by a strong, linear RF field. Both the rotating and the counter-rotating components of the field were maintained throughout the calculations. For strong fields, many peaks were present in the frequency spectrum and were explained in terms of decay from dressed atomic states. These calculations were compared with frequency distributions for a rotating RF field and with the lowest order approximation for a linear RF field. The energy levels of the dressed atomic states were derived from the locations of the peaks in the frequency distribution. The Bloch-Siegert shifts of the resonances for the excited states were calculated as a function of the RF field strength. The calculated results for the Bloch-Siegert shifts and for the emitted distribution of frequencies were compared with recent experimental results. Dissert. Abstr.

N79-12866 Kansas State Univ., Manhattan.

RADIATIVE ELECTRON REARRANGEMENT AND POLARIZATION IN TARGET K X-RAY SPECTRA Ph.D. Thesis

Keith Albert Jamison 1978 139 p

Avail: Univ. Microfilms Order No. 7821872

A free atom decay process is shown to be a two-electron one-photon decay. Because this decay promotes one electron to a higher shell while allowing the other to fall to a lower shell, it is referred to as radiative electron rearrangement (RER). Theoretical calculations of the transition energies, line strengths and line widths were formed to verify the origin of the RER lines. The polarization of k alpha satellite radiation from targets of Al and Si, which is observed experimentally with a curved crystal polarimeter, is due to the non-statistical population of the magnetic substates created in specific ion-atom collisions. Further the polarization of the RER lines is studied. Dissert. Abstr.

N79-12867 Cincinnati Univ., Ohio.

MEASUREMENT OF THE ENERGY DEPENDENCE OF THE DIFFERENTIAL CROSS SECTION FOR ELECTRON-HELIUM SCATTERING BELOW FIVE ELECTRON-VOLTS Ph.D. Thesis

Richard Gregory Rolfes 1978 105 p

Avail: Univ. Microfilms Order No. 7821592

Relative differential cross sections for electron-helium scattering are measured for collision energies between 0.5 and 5.0 eV and scattering angles between 15 and 35 degrees. The results agree favorably with that of theoretical calculations and other experiments as far as the angular variation of the cross section is concerned. The energy dependence of the results indicates a stronger interaction at low energy than is predicted by theory or measured in most of the other experiments. Dissert. Abstr.

N79-12868 Lowell Univ., Mass.

IMPACT THEORY OF PRESSURE BROADENING AND SHIFT FOR MOLECULAR LINE SPECTRA Ph.D. Thesis

Edward Timothy Salesky 1978 165 p
Avail: Univ. Microfilms Order No. 7821553

The semi-classical limit of the Baranger Theory for impact broadening and shift for molecular spectra is considered in conjunction with a linked cluster expansion for the rotationally invariant part of the collision operator, resulting in a natural cutoff at small values of the impact parameter. By maintaining the correct correspondence between elastic and inelastic effects, the elastic are treated as well as the rotationally invariant inelastic effects to infinite order. Comparisons with various other impact theories are considered and the results of numerical calculations are presented. The results indicate that the proposed cutoff provides improved agreement with experimental data. By fitting the experimental data of Miziolek for HCl foreign gas broadening in the DCL fundamental vibrational band, the quadrupole moments of N2, O2 and CO are determined to be 1.33 D-A deg, 0.40 D-A deg and 2.20 D-A deg, respectively. Dissert. Abstr.

N79-12869 Stanford Univ., Calif.
SEMICLASSICAL PERTURBATION THEORY OF ELECTRON-POLAR MOLECULE COLLISIONS: TOTAL EXCITATION AND SCATTERING CROSS SECTIONS Ph.D. Thesis
Debasish Mukherjee 1978 178 p
Avail: Univ. Microfilms Order No. 7822550

Tests demonstrate that the chief limitation of the semiclassical perturbation scattering technique occurs when the small perturbation assumption fails to apply, as when the cross section is dominated by hard impacts at small impact parameters. Its second principal limitation is at very small values of the quantum numbers, but evidence suggests that this defect is not very serious for quantum numbers greater than about 3. Neither of these principal sources of error is likely to have a serious effect on the total and excitation cross sections for polar molecules. It is demonstrated that the Born approximation is suitable only for values of beta significantly less than unity, and that it is not at all suited for calculations in the region of physical interest for highly polar molecules for which beta is significantly greater than 1. Dissert. Abstr.

N79-12870 Wisconsin Univ. - Madison.
THEORETICAL ANALYSIS OF INELASTIC MOLECULAR COLLISIONS: APPLICATIONS TO ATOM-DIATOM SYSTEMS RELEVANT TO LASER OPERATION Ph.D. Thesis
Thomas Forbes Ewing, Jr. 1978 106 p
Avail: Univ. Microfilms Order No. 7815407

The theoretical developments focus on unitary approximations to the scattering matrix which utilize the simplicity of low-order perturbation theory integrals but essentially reorganize this information to provide high-order, nonperturbative results such as multiquanta transitions. Current classical, semiclassical and quantal theories for treating inelastic collisions are reviewed. A detailed model computational assessment is made of the alternative methods using simple collision models to establish guidelines for the effective use of these methods under various conditions. A refined computational approach is developed and employed to study vibrational relaxation in the He-CO and He-HF collision systems. A documented listing and sample run of the FORTRAN program developed and used to study inelastic collisions in the HE-CO and He-HF is presented. Dissert. Abstr.

N79-12871 Minnesota Univ., Minneapolis.
SCATTERING EXPERIMENTS WITH FAST PULSED MOLECULAR BEAMS Ph.D. Thesis
Peter Pui-Tak Chow 1977 178 p
Avail: Univ. Microfilms Order No. 7823885

The molecular beam source developed in these experiments is different from the conventional ones. Instead of a continuous flux (CW) of beam particles the present beam source is operated in a pulsed mode. Two sets of experiments were performed. In the gas-surface collision experiments the momentum change of the gas molecules as well as their angular distribution after the scattering were measured. The energy dependence of the collision was also investigated. The second set of experiments is the crossed beam studies of inelastic scattering. Rotationally inelastic events were shown to occur in collisions between the inert atom-polar molecule pair and two polar molecules. Measurements were compared to Monte Carlo computer simulations to estimate the extent of the rotational excitation. Dissert. Abstr.

N79-12872 Stanford Univ., Calif.
OPTICAL AND HALL EFFECT STUDIES OF NIOBIUM AND TRANSITION METAL COMPOUNDS OF THE A-15 STRUCTURE Ph.D. Thesis
Michael Christopher OConnor 1978 142 p
Avail: Univ. Microfilms Order No. 7822552

The temperature dependencies of the optical properties and low-field Hall effect of Nb3Sn, V3Si, V3Ge and elemental Nb were examined. Transmission and absorption measurements on 500 A films of electron beam co-evaporated Nb3Sn were made at approximately 5 K between 0.5 and 4.5 eV. Similar absorption measurements were made on an electropolished V3Si single crystal. Thermally-modulated reflectance measurements were also made on V3Si as a function of photon energy and quiescent temperature through the martensitic transformation temperature. Implications with respect to fine structure in the electronic density of states is discussed. V3Si, V3Ge, and Nb were found to have temperature dependent Hall coefficients. A specific mechanism, interband scattering, is advanced to explain the temperature dependence in Nb. Dissert. Abstr.

N79-12873 Princeton Univ., N. J.
AN INELASTIC ELECTRON SCATTERING INVESTIGATION OF THE COMPLETE 4d SHELL Ph.D. Thesis
Carl Peter Franck 1978 192 p
Avail: Univ. Microfilms Order No. 7823516

In order to test for collective behavior in the filled 4d shell of single atoms with Z approximately 54, inelastic electron scattering experiments were performed on thin films of antimony, tellurium and barium fluoride using 300 KeV electrons. The Te measurements at low momentum transfers are in absolute agreement with photoabsorption results. For Te, a high concentration of oscillator strength is found in the broad maximum which dominates the 4d excitation spectrum. A background subtraction was used to locate the energy centroid of this feature. In a comparison with simple models, the measured energy shift in the 4d continuum as a function of momentum transfer favors a single particle rather than collective description. Dissert. Abstr.

N79-12874# Illinois Univ. at Urbana-Champaign, Urbana. Dept. of Physics.
SCALE BREAKING CORRECTIONS TO CHARM AND BOTTOM PRODUCTION
R. J. DeWitt, D. E. Willen, and H. W. Wyld Oct. 1978 29 p refs
(ILL-(TH)-78-45) Avail: NTIS HC A03/MF A01

The Altarelli-Parisi equations are numerically solved to obtain parton distributions dependent on both x and Q squared. Using these, cross sections for the photoproduction, gluon fusion production and Drell-Yan production of cc bar X and bb bar X from protons, including scale breaking effects are calculated. It was found that for sufficiently heavy flavor production, photoproduction is larger than hadroproduction and scale breaking corrections decrease the cross sections. G.Y.

N79-12875# Duke Univ., Durham, N. C.
INTRAMOLECULAR REACTIONS OF UNSATURATED PEROXIDES AND PEROXY RADICALS Final Report, 1 May 1975 - 30 Apr. 1978
Ned A. Porter Jul. 1978 10 p refs
(Grant DAHC04-75-G-0117)
(AD-A057357; ARO-12782.5-C) Avail: NTIS HC A02/MF A01 CSCL 07/2

The mechanisms of free radical oxidation of organic compounds have been studied. It has been determined that unsaturated peroxy radicals will undergo cyclization reactions leading to a variety of cyclic peroxide compounds. It appears that peroxy radicals derived from naturally occurring organic compounds such as rubbers, fats, and oils, are converted into a variety of compounds that contain the cyclic peroxide nucleus. Simple model compounds that permit the study of the peroxy radical cyclization have been examined. These model studies show that, in addition to cyclic peroxides, a variety of compounds that include epoxides and alcohols are formed by free radical mechanisms. Thus, primary products are to be expected from autoxidation of natural materials

such as fats and rubbers and mono and bicyclic peroxides and epoxy alcohols. Author (GRA)

N79-12876# Army Electronics Research and Development Command, Fort Monmouth, N. J. Electronics Technology/Devices Lab.
NUMERICAL EVALUATION OF LINDHARD'S THEORY OF STOPPING POWER
G. J. Afrate, R. Lefker, and J. F. Ziegler Aug. 1978 11 p
(DA Proj. 1L1-61102-AH-47)
(AD-A059230; DELET-TR-78-20) Avail: NTIS HC A02/MF A01 CSCL 20/8

Stopping powers derivable from Lindhard's dielectric theory of stopping for a charged particle in a uniform electron gas are calculated as a continuous function of electron density for a wide variety of projectile energies ranging from 100 to 10000 keV/amu. Results are presented for electron densities varying from 10x22 to 10x32 electrons per cubic centimeter, a range which includes electron densities generally found for the energy bands of solids and for the atomic levels of atoms.
Author (GRA)

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation*.

N79-12877 State Univ. of New York at Stony Brook.
SLOW PROTON PRODUCTION AND NEUTRON DISSOCIATION AT 100 AND 400 GeV/c FROM NEUTRON TARGETS IN HADRON-DEUTERON COLLISIONS Ph.D. Thesis
Arthur Ted Brody 1978 244 p
Avail: Univ. Microfilms Order No. 7821195

Data obtained from exposures of the 30-inch Fermilab deuterium-filled bubble chamber to mixed, positively charged beam particles incident at 100 GeV/c and proton beam particles incident at 400 GeV/c are analyzed. Topological hd and hn cross sections are extracted from both data samples. Events with 3 or 4 prongs at 100 GeV/c are fit to the mass hypothesis hd yields hpp(neg pi) and a free neutron cross section for hn yields h(p neg pi) is extracted. This cross section is then compared with values obtained at other energies or measured using different techniques. The production of protons with laboratory momenta less than 1.4 GeV/c is also studied for the full event samples at both energies. The inclusive proton cross sections are seen to scale as functions of sq m/s and t. These cross sections were studied in the context of a Mueller-Regge formalism.
Dissert. Abstr.

N79-12878 Yale Univ., New Haven, Conn.
POLARIZATIONS AND ANGULAR DISTRIBUTIONS IN THE ELASTIC SCATTERING OF PIONS AND PROTONS FROM POLARIZED PROTONS AT FERMILAB ENERGIES Ph.D. Thesis
James Harmon Snyder 1978 214 p
Avail: Univ. Microfilms Order No. 7820802

A double-arm spectrometer whose components were multiwire proportional chambers and analysis magnets was used to measure polarizations and angular distributions in the elastic scattering of pions and protons from polarized protons in the kinematic range 0.2 less than or equal -t less than or equal 1.6Ge(sq V) incident momenta of 100 GeV for pions and 100 and 300 GeV for protons. The pi polarization data are consistent with the predictions. The pi angular distributions are found to be consistent with existing differential cross-section data. The pp polarization data are consistent with model predictions at small and intermediate t. The pp angular distributions are consistent with existing differential cross-section data.
Dissert. Abstr.

N79-12879 Yale Univ., New Haven, Conn.
A MEASUREMENT OF ASYMMETRIES IN SPIN DEPENDENT DEEP INELASTIC SCATTERING Ph.D. Thesis
Douglas Arthur Palmer 1978 170 p
Avail: Univ. Microfilms Order No. 7820168

The asymmetry in deep inelastic scattering of longitudinally polarized electrons by longitudinally polarized protons was measured in the kinematic range 2 less than or equal W less than or equal 10 (GeV), 1 less than or equal sq Q less than or equal 4 (sq GeV/c). Measurements at seven deep-inelastic kinematic points, when radiatively corrected, show that the asymmetries: (1) are large and positive and decrease with increasing omega in accord with quark-parton models; (2) are consistent with scaling; and (3) provide some quantitative verification of the Bjorken Sum Rule. An upper limit was established for parity violations in the scattering of polarized electrons from unpolarized nucleons. Dissert. Abstr.

N79-12880 Washington Univ., Seattle.
PION-NUCLEI INTERACTIONS AT 200 GeV Ph.D. Thesis
Myau-Yin Lee 1978 169 p
Avail: Univ. Microfilms Order No. 7820738

Tungsten and chromium microgranules embedded in emulsion plates were used as targets in exposure to 200 GeV pion beams. The multiplicity distributions of the resulting interactions are broader than the Poisson distribution and exhibit scaling. The relation between the multiplicity ratio and the average number of collisions falls onto the line which favors the predictions of the modified energy flux cascade and two-phase models as well as the parton models. Average multiplicity is also linearly dependent on the number of heavy tracks. Two-particle rapidity correlations are strong in the target fragmentation regions. The characteristics of the two-dimensional contour plot of the correlation function R(y sub 1, y sub 2) are very different from those of hadron-hadron interactions. Dissert. Abstr.

N79-12881 Illinois Univ. at Urbana-Champaign, Urbana.
AN INVESTIGATION OF PIONS IN NUCLEAR MATTER AND NUCLEI Ph.D. Thesis
Philip Thomas Cahill 1978 207 p
Avail: Univ. Microfilms Order No. 7820912

The Fermi-averaged pion-nuclear matter scattering matrix in the region of the $N^*(1232)$ resonance is calculated using two models, one incorporating a single channel (I = 1) potential separable in the pion-nucleon relative coordinate and a realistic nucleon pseudopotential to investigate the effects of the Pauli Principle and nucleon recoil and binding, and the other fixing the positions of the nucleons to investigate the effects of two-nucleon scattering and correlations. An estimate utilizing the exact model wave functions is made of the matrix elements describing pion, two-nucleon scattering and pion absorption and re-emission on two nucleons, which indicates that these two processes are approximately of equal importance. Dissert. Abstr.

N79-12882 Michigan Univ., Ann Arbor.
ON THE OBSERVABILITY OF LARGE WEAK INTERACTIONS AT VERY HIGH ENERGIES Ph.D. Thesis
Howard Eli Haber 1978 216 p
Avail: Univ. Microfilms Order No. 7822908

The possibility that some weak interaction cross sections become large at very high energies was investigated. Weak interaction effects at the very high energy colliding beam machines can be identified by detecting parity violating effects in the production of hadron resonances. Numerical results indicate that such effects due to the production of W's and Z's should be observable at Isabelle energies. Observation of such effects may be the best method to establish that new behavior of cross sections is not hadronic in origin. By observing hadron resonances with different quantum numbers, the flavor dependence of high energy weak effects can be studied. Weak interaction cross sections for the scattering of polarized beams are calculated and the possibility of observing unconventional kinds of weak interactions is considered. Dissert. Abstr.

N79-12883 Princeton Univ., N. J.
NATURAL APPROXIMATE LEPTON SYMMETRIES Ph.D. Thesis
Stephen Matthew Barr 1978 103 p
Avail: Univ. Microfilms Order No. 7823504

The origin of the electron mass in the context of spontaneously broken gauge theories of the weak interactions is studied from

the point of view that the electron mass is naturally zero to lowest order of the weak interactions and receives a finite calculable contribution from one (or more) loop corrections. Several approaches are examined, some based upon the minimal SU(2) X U(1) gauge group of the weak interaction. Also models are exhibited in which the electron mass is calculable in terms of known quantities such as the muon mass, the fine structure constant and the Weinberg angle. These models require an extended gauge group. The rate is computed for the decay of the muon into two electrons and a positron, which violates muon number conservation. Two SU(2) X U(1) models of the weak interactions which exhibit natural approximate conservation of muon number are used. Dissert. Abstr.

N79-12884*# TRW Defense and Space Systems Group, Redondo Beach, Calif.
ION BEAM TECHNOLOGY APPLICATIONS STUDY Final Report
J. M. Sellen, Jr. 1 Nov. 1978 36 p
(Contract NAS3-21027)
(NASA-CR-159437; TRW-32100-6009-RU-00) Avail: NTIS HC A03/MF A01 CSCL 20H

Specific perceptions and possible ion beam technology applications were obtained as a result of a literature search and contact interviews with various institutions and individuals which took place over a 5-month period. The use of broad beam electron bombardment ion sources is assessed for materials deposition, removal, and alteration. Special techniques examined include: (1) cleaning, cutting, and texturing for surface treatment; (2) crosslinking of polymers, stress relief in deposited layers, and the creation of defect states in crystalline material by ion impact; and (3) ion implantation during epitaxial growth and the deposition of neutral materials sputtered by the ion beam. The aspects, advantages, and disadvantages of ion beam technology and the competitive role of alternative technologies are discussed. A.R.H.

N79-12885# National Technical Information Service, Springfield, Va.
ELECTRON BEAM FUSION. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Aug. 1978
George W. Reimherr Sep. 1978 94 p Supersedes NTIS/PS-77/0820; NTIS/PS-76/0862; NTIS/PS-75/784
(NTIS/PS-78/0921/3; NTIS/PS-77/0820; NTIS/PS-76/0862; NTIS/PS-75/784) Avail: NTIS HC $28.00/MF $28.00 CSCL 18A

The bibliography cites research reports on using electron beams to initiate fusion as an alternative to laser fusion. GRA

74 OPTICS

Includes light phenomena.

N79-12886 Colorado Univ. at Boulder.
HIGH RESOLUTION OPTICAL SPECTROSCOPY: OPTICAL RAMSEY FRINGES; NEON ISOTOPE AND HYPERFINE STUDIES Ph.D. Thesis
James Charles Bergquist 1978 171 p
Avail: Univ. Microfilms Order No. 7820486

Thermal motion of free atoms and molecules gives rise to Doppler broadening of the characteristic spectral transitions, which often blurs important details in the optical spectra. Optical Ramsey interference fringes are demonstrated. An optically stabilized, precision frequency spectrometer was designed and constructed, utilizing narrow band, widely tunable dye lasers. With this spectrometer, initial studies of the hyperfine structure of Ne21 and the isotope shift of 20,21, and 22 neon were performed. Dissert. Abstr.

N79-12887 Purdue Univ., Lafayette, Ind.
METAL AND DIELECTRIC OVERLAY EFFECTS ON OPTICAL INDIFFUSED WAVEGUIDES FOR APPLICATIONS IN INTEGRATED OPTICS Ph.D. Thesis
Talal Khalil Findakly 1978 123 p
Avail: Univ. Microfilms Order No. 7821446

Planar optical waveguides formed by metallic ion indiffusion in LiNbO3 with emphasis on the effects of metal or dielectric film overlay loading were studied. These effects were utilized to achieve two-dimensional beam confinement which is necessary for beam steering and bending of optical beams in integrated optic circuitry. Particular emphasis is placed on the utilization of such guiding channels in passive application. A concept of directional couplers with variable spacing is introduced and extensively treated as a substitute to parallel channeled directional couplers. A procedure is developed to facilitate the design of such devices in accordance with the desired functions of the devices. The modification of parallel couplers by the introduction of variable channel spacing relaxes the fabrication tolerance associated with parallel couplers and improves upon device performance. Possible application for optical switching and modulation by utilizing the basic directional coupler structure in conjunction with the electro-optic properties of LiNbO3 are included. Dissert. Abstr.

N79-12888 Illinois Univ. at Urbana-Champaign, Urbana.
CROSSED-FIELD SAMPLING OF PICOSECOND OPTICAL SIGNALS Ph.D. Thesis
Sears William Merritt 1978 127 p
Avail: Univ. Microfilms Order No. 7821014

The analysis, design, and characterization of a crossed-field sampling photomultiplier with demonstrated resolution of 150 psec optical signals are described. The phase angle over which photoelectrons were selected for amplification was restricted by injecting photoelectrons into a region where a large rf electric field and a crossed magnetic field imparted spatial and energy distributions as functions of time to the photoelectrons. Characterization of the device incorporated the use of a mode-locked cw dye laser designed specifically for the task. The sampling function of the device was determined by convolving the optical pulse train with the rf electric field driving the DCFP and recording the signal generated at the difference frequency. Dissert. Abstr.

N79-12889 Arizona Univ., Tucson.
REMOTE DETECTION OF ATMOSPHERIC PARTICULATES USING A BISTATIC LIDAR Ph.D. Thesis
Dale Matson Byrne 1978 156 p
Avail: Univ. Microfilms Order No. 7824360

A technique is developed to remotely determine the refractive index and size distribution of atmospheric particulates. An auxiliary set of measurements comprised of spectral optical depth values is used to infer a columnar particle size distribution which represents the aerosol particles throughout the vertical extent of the atmosphere. The advantage in using these measurements to infer the columnar particle size distribution lies in the weak sensitivity of the spectral optical depth values to particulate refractive index. A scaled columnar distribution used as an estimate of the unit volume distribution, and a grid search optimization procedure is used to determine the refractive index which best fits the angular scattering data. A numerical inversion is then performed on the angular scattering data to derive a unit volume size distribution. Dissert. Abstr.

N79-12890* National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
ILLUMINATION CONTROL APPARATUS FOR COMPENSATING SOLAR LIGHT Patent
Lester J. Owens, inventor (to NASA) Issued 24 Oct. 1978 8 p Filed 23 Dec. 1976 Supersedes N77-15493 (15 - 06, p 0769)
(NASA-Case-KSC-11010-1; US-Patent-4,122,334; US-Patent-Appl-SN-753977; US-Patent-Class-250-214R; US-Patent-Class-200-61; US-Patent-Class-200-46; US-Patent-Class-250-214AL; US-Patent-Class-315-153) Avail: US Patent and Trademark Office. CSCL 20F

An illumination control apparatus is presented for supplementing light from solar radiation with light from an artificial light source to compensate for periods of insufficient levels of solar light. The apparatus maintains a desired illumination level within an interior space comprising an artificial light source connected to an electrical power source with a switch means for selectively energizing said light source. An actuator means for controlling the on-off operation of the switch means is connected to a light sensor which responses to the illumination

level of the interior space. A limit switch carried adjacent to the actuator limits the movement of the actuator within a predetermined range so as to prevent further movement thereof during detection of erroneous illumination conditions

Official Gazette of the U.S. Patent and Trademark Office

N79-12891# Army Construction Engineering Research Lab., Champaign, Ill.

POTENTIAL USES OF FIBER OPTICS IN ARMY FIXED FACILITIES

R. G. McCormack Jul. 1978 48 p refs
(DA Proj. 4A7-62719-A-T40)
(AD-A057956; CERL-SR-M-241) Avail: NTIS HC A03/MF A01 CSCL 09/3

This report describes the results of a study performed to identify potential uses of fiber-optic data transmission links in Army fixed facilities. The uses identified are related to monitoring and controlling electrical-mechanical functions of the facility, primarily in Nuclear Electromagnetic Pulse (EMP) hardened facilities, but also nonhardened facilities. As an example, a comparison is made between fiber-optic and conventional wired data links in an automated monitoring and control system for energy control. Examples are given illustrating general cost comparisons between the fiber optic and conventionally wired systems. Conclusions are that fiber-optic data transmission links may be practical for use in Army fixed facilities where such links are advantageous to circumvent particular threats or in large complex systems where data rates are high. Author (GRA)

N79-12892# ARO, Inc., Arnold Air Force Station, Tenn.

INFRARED SOURCE TO SIMULATE EARTH-LIMB BACKGROUND Final Report

Willis L. Clark AEDC Aug. 1978 30 p
(AD-A057954; AEDC-TR-77-119) Avail: NTIS HC A03/MF A01 CSCL 17/5

This report describes the preliminary design and check out of an earth-limb simulator. The actual simulator will operate in a temperature range from 40 K to 100 K for an altitude range of 60 to 115 km. In order to check the design, temperatures were uniformly elevated for the preliminary testing.

Author (GRA)

N79-12893# Boeing Aerospace Co., Seattle, Wash. Logistics Support and Services.

OPTICAL POWER SPECTRUM ANALYSIS OF DISPLAY IMAGERY Final Report, 3 May 1976 - 31 Mar. 1978

Richard A. Schindler and Wayne L. Martin Wright-Patterson AFB, Ohio AMRL Jun. 1978 134 p refs
(Contract F33615-76-C-0030; AF Proj. 2313)
(AD-A058040; AMRL-TR-78-50) Avail: NTIS HC A07/MF A01 CSCL 14/2

This report describes the approach, procedures and results of a series of studies to examine the use of a simple, rapid measurement technique for the quantitative evaluation of display imagery. This technique, diffraction pattern sampling, provides an estimate of the image optical power spectrum. The resulting values are used to calculate the image information density for CRT imagery under various levels of display operating parameters. The resulting information density values are compared with observer target recognition performance under the same display conditions. The report considers the effectiveness, characteristics and limitations of the diffraction pattern sampling technique.

Author (GRA)

N79-12894# Naval Postgraduate School, Monterey, Calif.

COMPUTER SIMULATION OF LIGHT PROPAGATION THROUGH A SCATTERING MEDIUM M.S. Thesis

Miles Allen Millbach Jun. 1978 65 p refs
(AD-A057991) Avail: NTIS HC A04/MF A01 CSCL 20/6

A Monte Carlo computer model was developed to simulate the propagation of light through a scattering/absorbing medium using various parameters and phase functions. The model permits characterization of the spatial and temporal spread of light traversing plane-parallel clouds. It was found that both the time and spatial spread of light in a scattering medium are independent of the details of the phase function for a cloud thickness of greater than 15 extinction lengths. Author (GRA)

N79-12895# Hughes Research Labs., Malibu, Calif.

OPTICAL-MICROWAVE INTERACTIONS IN SEMICONDUCTOR DEVICES Final Report, 17 Jun. 1977 - 16 Jun. 1978

Huan-Wun Yen and Michael K. Barnoski Jul. 1978 61 p refs
(Contract N00173-77-C-0156)
(AD-A059064) Avail: NTIS HC A04/MF A01 CSCL 09/1

Theoretical and experimental studies of direct-current modulation of semiconductor injection lasers were carried out. The small-signal modulation frequency response of a single-mode laser was measured and found to agree well with the calculation result. Direct modulation of a single-mode laser up to 6 GHz was achieved. Experiments on optical injection locking of a transistor oscillator were carried out. Injection locking was achieved not only at fundamental frequencies but also at various subharmonics with less tolerance in frequency deviation. It is also possible to perform simultaneous switching and phase locking in these oscillators. We have also succeeded in phase locking a GaAs FET oscillator at 7 GHz with an injected optical signal modulated at 3.5 GHz. A novel scheme of carrying out microwave mixing in GaAs FET amplifiers was demonstrated in which one of the signals is fed into the input port of the amplifier while the local oscillator signal is introduced through optical injection and the mixed signal is taken from the output port of the amplifier. Experimental results on the optical switching of GaAs IMPATT diode oscillators is presented. The IMPATT microwave output power can be either enhanced or reduced depending on the bias condition and the microwave cavity tuning. GRA

N79-12896# Visidyne, Inc., Burlington, Mass.

A HIGH ALTITUDE INFRARED RADIANCE MODEL Final Report, Jul. - Sep. 1977

T. C. Degges and H. J. P. Smith Hanscom AFB, Mass. AFGL 30 Nov. 1977 299 p refs
(Contract F19628-77-C-0041)
(AD-A059242; VI-395; AFGL-TR-77-0271) Avail: NTIS HC A13/MF A01 CSCL 04/1

A knowledge of the natural infrared radiance originating in the earth's upper atmosphere is of interest for systems design, military surveillance and the advancement of knowledge about physical processes in the upper atmosphere. A physical model that includes experimental data on and theoretical estimates of excitation processes that lead to emission of infrared radiation has been implemented in a computer program that computes infrared radiances for an earth's limb viewing geometry. The nominal spectral region of this study lies between 2.7 and 25 micrometers and emphasis is placed on radiation originating at altitudes between 70 and 500 km. The physical model is described, with emphasis on the changes required in extending its usefulness. Application of the computer program is described. Model predictions are compared with radiance data obtained in the ICECAP auroral studies program. This comparison is used to illustrate uncertainties in results due to assumptions made in the model and lack of data on actual atmospheric composition.

Author (GRA)

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion. For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N79-12897 Stevens Inst. of Tech., Hoboken, N. J.

COMPUTER SIMULATION OF BEAM-PLASMA INTERACTION Ph.D. Thesis

Barton Mitchel Goldstein 1978 145 p
Avail: Univ. Microfilms Order No. 7821619

In the nonlinear regime of beam plasma instability, the amplifying instability evolves into a steady state while the oscillating instability is characterized by large temporal fluctuations of the waves in the system. This is verified computationally. The amplifying instability is studied by means of the technique of computer simulation of plasmas. Harmonic generation is shown to be predictable from simple concepts. Slow modes are produced by a quasi-linear-like mechanism and fast modes are generated due to mode coupling. The generation of harmonics is studied in the magnetized plasma. If a wave is excited near the constant

phase velocity portion of the dispersion relation of the ambient plasma, its harmonic grows to sufficient amplitude to destroy the trapped particle oscillations of the initial wave. These results are verified by the technique of numerical simulation of plasmas. Dissert. Abstr.

N79-12898 Stevens Inst. of Tech., Hoboken, N. J.
REFLEX DISCHARGE IN CUSP AND UNIFORM MAGNETIC FIELDS Ph.D. Thesis
Stevens Ira Friedman 1977 71 p
Avail: Univ. Microfilms Order No. 7821617

Hot cathode reflex discharges were operated in both uniform and cusp magnetic fields, and compared with regard to efficiency of ion production, current-voltage characteristics, electron energy distribution functions, and stability. While the uniform field gives better electron confinement and hence higher efficiency, the cusp field discharge is stable over a wider range of neutral densities and magnetic field strengths. The experiment results can be explained on the basis of classical electron transport. This is shown using simple physical arguments, along with Monte-Carlo computer calculations of electron trajectories, taking into account ionization, excitation, and elastic collisions with neutrals. Dissert. Abstr.

N79-12899 Colorado Univ., Boulder.
LASER-PLASMA INTERACTION IN A THETA-PINCH GEOMETRY Ph.D. Thesis
William Thomas Amstrong 1978 170 p
Avail: Univ. Microfilms Order No. 7820483

A prompt stimulated Brillouin scatter (SBS) signal was analyzed during an experiment wherein a high power, pulsed CO2 laser irradiated an independently produced, theta-pinch plasma. The SBS signal consisted of a single, strong pulse occurring within plus or minus 15 ns of the incident beam's peak power. The signal displayed some intermittency and shot-to-shot power fluctuation. A breif period of reduced temperature gradient, and corresponding enhanced SBS coupling, occurs near peak incident power. The constraint of significant SBS gain to this time period is consistent with the single pulse characteristic and power fluctuations of the SBS signal. The SBS signal was red shifted by approximately 51 A which corresponds to the ion-acoustic frequency. Measurements of density profiles and temperature histories permitted examination of laser refraction, local heating and net absorption.
Dissert. Abstr.

N79-12900 Yale Univ., New Haven, Conn.
ELECTROSTATIC CONFINEMENT OF A LASER PRODUCED PLASMA Ph.D. Thesis
Michael Shawn Mussetto 1978 119 p
Avail: Univ. Microfilms Order No. 7820167

An experiment in electrostatic confinement is described in which a large electron flux is discharged into an expanding laser produced plasma. This results in space charge overcompensation and electrostatic inhibition to the escape of the laser produced ions from the discharge. The laser produced plasma was created by focussing a submicrosecond 10.6 micron radiation pulse from a CO2 laser onto a carbon target in vacuum which also served as a cathode for the discharge. Discharge currents resulting in the confinement were studied in the range up to 300 amps, with corresponding discharge running voltages up to -150 volts. Electrostatic inhibition to ion escape was accomplished by establishing self-consistent electric fields in the discharge and a collisionless sheath at the discharge anode (the grounded walls of the vacuum system in which the discharge occurs). The mechanisms that play a role in the confinement are examined in a variety of idealized models. Dissert. Abstr.

N79-12901 Washington Univ., Seattle.
THE EFFECT OF COLD PLASMA ON THE KELVIN-HELMHOLTZ INSTABILITY Ph.D. Thesis
Barbara Gene Melander 1978 137 p
Avail: Univ. Microfilms Order No. 7820747

The effect of a two-component plasma (hot and cold) on the shear driven Kelvin-Helmholtz instability is studied. An ion distribution with a shear flow parallel to the ambient magnetic field and a density gradient parallel to the shear direction is used. Both the electrostatic and electromagnetic versions of the instability are studied in the limit of hydromagnetic frequencies. The dispersion relation is obtained in the electrostatic case by solving the Vlasov equation for the perturbed ion and electron densities and then using the quasineutrality condition. In the electromagnetic case the coupled Vlasov and Maxwell's equations are solved to obtain the dispersion relation. Dissert. Abstr.

N79-12902 Wisconsin Univ. - Madison.
A RAY TRACING ANALYSIS OF FAST WAVE HEATING OF TOKAMAKS Ph.D. Thesis
Brian David McVey 1978 159 p
Avail: Univ. Microfilms Order No. 7815058

Radio frequency (RF) heating via the fast wave in the ion cyclotron range of frequencies (ICRF) is considered for elevating the temperature of a Tokamak plasma to ignition conditions. The propagation characteristics of a single fast wave in the interior of the plasma were studied, as a function of its prescribed wave number at the edge. Ray tracing results yield profiles of the deposition of RF power over the minor cross section. The deposition of power is strongly dependent upon the parallel (to the magnetic field) wave number prescribed at the edge and upon the frequency selected. The selection of a frequency determines the particular ICRF heating scheme to be utilized. In the ICRF, it is possible to heat at the fundamental or second harmonic cyclotron frequency and at the two-ion hybrid resonance. Each of these three heating schemes is analyzed.
Dissert. Abstr.

N79-12903 Stevens Inst. of Tech., Hoboken, N. J.
EXPERIMENTAL INVESTIGATION OF STABILITY IN A HIGH ENERGY PLASMA CONFINED BY A SIMPLE MAGNETIC MIRROR FIELD (MIGMA) Ph.D. Thesis
James Ronald Treglio 1977 166 p
Avail: Univ. Microfilms Order No. 7821636

A plasma, formed by direct injection of 1.1 to 1.25 MeV molecular deuterium ions, was stably confined by a simple magnetic mirror field, in a device named Migma. The plasma ion number was determined by using both silicon surface barrier detectors and an RF pickup system. For the former, a Monte Carlo type simulation of the system was employed to analyze the experimental data. The two methods were found to agree at a value for the trapped ion number within the experimental error. The RF systems also measured the impact parameter distribution of the trapped ions. An analytic simulation of beam-gas dissociation was found to fit the experimental data at poor vacuums; at good vacuums, the experimental data indicated a higher trapping rate than possible due to beam-gas collisions, and an impact parameter more highly peaked at cell center than expected. Dissert. Abstr.

N79-12904 Washington Univ., Seattle.
CO2 LASER HEATING PHENOMENA IN A FAST SOLENOID PLASMA Ph.D. Thesis
Hiroshi William Hoida 1978 175 p
Avail: Univ. Microfilms Order No. 7824462

The experiment was successful in studying the propagation of the laser beam in the plasma and demonstrating the creation of a high beta slender plasma column from a low beta pinched plasma by the efficient heating of the column with an intense trapping laser beam. Dissert. Abstr.

N79-12905 Georgia Inst. of Tech., Atlanta.
SELF-TRAPPING OF ELECTRONS AND POSITRONS IN DENSE HELIUM GAS: A SIMPLE VARIATIONAL MODEL Ph.D. Thesis
Charles Lee Cleveland 1978 177 p
Avail: Univ. Microfilms Order No. 7823709

The exact ground state solution to Schroendinger's equation for the finite square well is used to predict the conditions under which the transition between free particle and self-trapped state occurs. The bulk properties of helium as a non-ideal gas are treated through an approximate lattice-gas equation of state. An expression for the surface energy of the density fluctuation produced by the self trapped particle is obtained. The self-trapping of an electron in helium is examined with respect to repulsion and attraction. At high densities, the self-trapped state appears to be energetically favorable. Surface energy is found

to play a significant role when the variational model is applied to positron self-trapping. Dissert. Abstr.

N79-12906 Maryland Univ., College Park.
MEASUREMENTS OF THE STARK BROADENING PARAMETERS OF SINGLY IONIZED SILICON LINES FROM PLASMA Ph.D. Thesis
Wei-Tau Chiang 1978 92 p
Avail: Univ. Microfilms Order No. 7823991

An electromagnetically driven shock tube was to generate a high-density helium plasma containing small silicon and hydrogen admixtures. Measurements of the Stark widths were made by photoelectrical scanning, fast scanning with a Fabry-Perot spectrometer, and an optical multichannel analyzer, on a plasma of electron density N sub e approximately and temperature kT approximately 1.5 eV. The measured half-widths of the lines in the two multiplets are in about 10% agreement with the widths estimated from a semi-classical calculation. Semi-empirical and quantum mechanical calculations give widths by as much as a factor of two below the measured widths. Dissert. Abstr.

N79-12907 Maryland Univ., College Park.
EXPERIMENTAL OBSERVATIONS OF THE EQUILIBRIUM AND STABILITY OF A NON-CIRCULAR CROSS SECTION TOROIDAL PLASMA Ph.D. Thesis
Andrew Wilson Allen, Jr. 1978 143 p
Avail: Univ. Microfilms Order No. 7823983

The equilibrium properties of an elongated cross section, toroidal plasma were determined by a variety of diagnostics including magnetic and electric probes, ion spectroscopy and CO2 laser interferometry. Flux surface diagrams were computed from the probe data which show the plasma shape and position in the vessel cross section. The stability properties of different equilibria were investigated by varying the toroidal field and measuring asymmetries in the poloidal field structure. Results show that m=1, n=1 MHD type link modes occur when the safety factor is less than one and total beta is greater than 10%. The growth rates for these instabilities are estimated and observations of the nonlinear development are discussed. Growth rates predicted by ideal MHD are in substantial agreement with those measured experimentally. Plasma energy loss and resistive effects are discussed. Dissert. Abstr.

N79-12908 Princeton Univ., N. J.
MAGNETIC RECONNECTION Ph.D. Thesis
Edward Allen Adler 1978 85 p
Avail: Univ. Microfilms Order No. 7823501

Reconnection at an x point is forced by moving together two parallel wires carrying currents in the same direction. For small wire displacements, the MHD equations can be linearized, and analytic solutions can be obtained. After the linearization breaks down, the behavior is estimated by making use of scaling arguments. The results are interpreted in terms of several current reconnection theories. It is concluded that reconnection speeds as high as the local Alfven speed are possible. The energetics of the linear tearing mode are analyzed and the energy is calculated directly by solving for the magnetic field to second order in the perturbation amplitude. Resistive effects can be important outside of the usual resistive layer encountered in the linear theory. If the magnetic energy density is defined to be sq B/2, then at points farther than a skin distance from the singular layer, the magnetic energy density increases. Dissert. Abstr.

N79-12909*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ADHESIVE BONDING OF ION BEAM TEXTURED METALS AND FLUOROPOLYMERS
Michael J. Mirtich and James S. Sovey 1978 14 p refs Presented at the 25th Natl. Vacuum Symp., San Francisco, 28 Nov. - 1 Dec. 1978 Sponsored by the Am. Vacuum Soc. (NASA-TM-79004; E-9790) Avail: NTIS HC A02/MF A01 CSCL 20I

An electron bombardment argon ion source was used to ion etch various metals and fluoropolymers. The metal and fluoropolymers were exposed to (0.5 to 1.0) keV Ar ions at ion current densities of (0.2 to 1.5) mA/sq cm for various exposure times. The resulting surface texture is in the form of needles or spires whose vertical dimensions may range from tenths to hundreds of micrometers, depending on the selection of beam energy, ion current density, and etch time. The bonding of textured surfaces is accomplished by ion beam texturing mating pieces of either metals or fluoropolymers and applying a bonding agent which wets in and around the microscopic cone-like structures. After bonding, both tensile and shear strength measurements were made on the samples. Also tested, for comparison's sake, were untextured and chemically etched fluoropolymers. The results of these measurements are presented. Author

N79-12910# Naval Research Lab., Washington, D. C.
HIGH-ENERGY ION EXPANSION IN LASER-PLASMA INTERACTIONS
Real DeCoste Apr. 1978 141 p refs
(AD-A057439; NRL-MR-3774) Avail: NTIS HC A07/MF A01 CSCL 20/9

The high-energy ions produced from the intense laser irradiation 10 to the 16th power W/sq cm at 1.06 micrometers of solid targets are studied both experimentally and theoretically. The ion diagnostics includes both charge collectors and an ion analyzer especially designed for energetic ion studies. Analyzer design considerations are presented together with a calibration technique of the ion detection system involving the measurement of secondary electron emission. A technique using charge exchange to differentiate ion species with the same A/Z but using different Z is also described. A 1-D fluid model describes the ambipolar expansion of hot electrons and either one or two relatively cold ion species from an electron pressure gradient. For CD sub n, the plasma expansion is adequately represented by a single ion species, whereas for CH sub n, two-ion fluids are required to account for the energy and the relative behavior of the high-energy ion species. GRA

N79-12911# Pennsylvania State Univ., University Park.
STUDY OF FLOW AND LOSS PROCESSES AT THE ENDS OF A LINEAR THETA PINCH Progress Report, 1 Jun. 1977 - 31 May 1978
Thomas M. York and E. H. Klevans Feb. 1978 201 p refs
(Contract EY-76-S-02-4020)
(COO-4020-6) Avail: NTIS HC A10/MF A01

End loss from a theta pinch was studied. Detailed diagnostic studies of a 25 cm long theta pinch operating with reversed trapped fields was completed; spectroscopic studies, magnetic probe, pressure probe, double diamagnetic loop, luminosity studies and Thomson scattering studies of the plasma were carried out over the 8 mu sec duration of the transient loss. Two new diagnostic techniques were developed based on the available Thomson scattering laser source. Plasma loss from a 10.5 long theta pinch with an axial Twyman-Green interferometer was reported. Experimental work on heat conduction loss being diagnosed by Thomson scattering data in the end region, with and without mirror coil, was completed as a part of the mirror field studies. DOE

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

N79-12912 Princeton Univ., N. J.
SPIN ECHOES IN A FLOWING SUPERFLUID HELIUM-3 -HELIUM-4 SOLUTION Ph.D. Thesis
Todd David Fansler 1978 228 p
Avail: Univ. Microfilms Order No. 7818329

The design, construction and results of an experiment exploring the use of pulsed nuclear magnetic resonance to study the flow of a superfluid He-3-He-4 solution are presented. Spin echoes were used to track the motion of the He-3 atoms. The alternating-phase spin-echo method adopted is analyzed in considerable detail. The apparatus constructed for the experiment (10.7 MHz phase-coherent pulsed NMR spectrometer; gas handling and cryogenic systems; and sample cell) is described. Dissert. Abstr.

N79-12913 Auburn Univ., Ala.
ANALYTICAL SOLUTIONS TO THE IMPURITY PROBLEM FOR ELECTRONS AND EXCITONS IN A ONE-DIMENSIONAL MODEL WITH ONE AND TWO BANDS Ph.D. Thesis
Donald Ray Payne 1978 72 p
Avail: Univ. Microfilms Order No. 7818632

An analytical solution to a one-dimensional tight binding band model is presented. Solutions are obtained for both single band and two band cases with only nearest neighbor hopping included and subject to the natural (fixed-end) boundary condition. The eigenequation for the Hamiltonian is then a second order finite difference equation which can be solved exactly using a finite transform technique. The solutions investigated include the wavefunctions, the energy eigenvalues, the density of states, and the conditions for localization. All the results are expressed analytically in terms of general parameters which, when specified appropriately, can be applied to various physical systems for electrons and excitrons. Dissert. Abstr.

N79-12914 Cornell Univ., Ithaca, N. Y.
TUNNEL-INJECTION ELECTROLUMINESCENCE AND STIMULATED EMISSION IN CADMIUM SULFIDE METAL-INSULATOR-SEMICONDUCTOR STRUCTURES Ph.D. Thesis
Francis Jermian Ryan 1978 223 p
Avail: Univ. Microfilms Order No. 7817806

An experimental study was made of the electroluminescence generated in n-type single crystal CdS platelets by hole tunnel-injection through a thin insulator film (about 8 nm thick) in metal-insulator-semiconductor (MIS) sandwich structures. The presence of continuous stimulated emission in forward biased MIS devices at 77 K was reported. All MIS structures were fabricated in a vacuum chamber by electron-beam deposition of metal and insulator films through shadow masks. The metals were Au, Al, and Pt and the insulator was Al2O3. The temperature dependence of current-voltage data on Al-Al2O3-CdS structures above and below a measured voltage threshold for DC electroluminescence was presented. Dissert. Abstr.

N79-12915 California Univ., Riverside.
COMPACT ZERO-DIMENSIONAL SEMILATTICES Ph.D. Thesis
Garr Stanley Lystad 1978 68 p
Avail: Univ. Microfilms Order No. 7821359

A characterization is obtained of topological semilattices whose lattices of closed congruences are compact topological lattices. A characterization is given also of topological semilattices whose lattices of closed congruences for which the quotient space is zero-dimensional are compact topological lattices. Finally, it is shown that requiring distributivity of either of these lattices of congruences is equivalent to requiring that the semilattice be a chain. A characterization of semilattices whose lattices of filters are compact topological lattices is given. This is used to give an independent proof of the result by Hofmann, Mislove and Stralka in that the lattice of filters on a semilattice is a distributive compact topological lattice if and only if the semilattice is primally generated. Dissert. Abstr.

N79-12916 Vanderbilt Univ., Nashville, Tenn.
LATTICE DYNAMICS OF MIXED CRYSTALS: ALKALI HALIDES Ph.D. Thesis
Nestor Emilio Massa 1977 222 p
Avail: Univ. Microfilms Order No. 7819535

The lattice dynamics of mixed crystal systems were evaluated by using the concept of a most probable or pseudo-unit cell as the repetitive unit in the lattice. This technique employs the simulation of a topological average on the lattice first, thereby enabling the use of the standard models of lattice dynamics for phonon calculations. The pseudo-unit cell is founded by A, (1-x)B and xC ions and the resulting mixed crystal lattice is a repetition of such cells. Results were compared to experimental infrared, Raman and neutron scattering data. Good agreement is found between the calculated results of the phonons at the zone center and available experimental data from infrared spectroscopy. A comparison with experimental Raman scattering measurements indicate a one to one correspondence with the calculated peaks of the one and two phonon density of states associated with the high symmetry points confirming the existence of a pseudo Brillouin zone at any concentration. Dissert. Abstr.

N79-12917 Stevens Inst. of Tech., Hoboken, N. J.
EXCHANGE AND CORRELATION EFFECTS IN TWO-DIMENSIONAL QUANTUM PLASMAS IN MAGNETIC FIELD Ph.D. Thesis
James Joseph Labonney 1978 159 p
Avail: Univ. Microfilms Order No. 7821622

The energies of a two-dimensional (2D) electron gas subject to Landau quantization in a magnetic field are analyzed here using thermodynamic Green's function methods. A careful evaluation of the exchange energy is carried out for high field strengths and the quantum strong field limit is examined. For low-intermediate field strengths, de Haas-van Alphen (DHVA) oscillatory corrections to the zero field exchange energy calculated by Stern are obtained. The lowest ring diagram contribution to correlation energy for zero magnetic field is found by analytical and numerical techniques jointly. Numerical results are presented for a typical Si-SiO2 interface inversion layer. The lowest ring diagram contribution to 2D correlation energy is evaluated analytically for arbitrary high field strength and in the quantum strong field limit. Dissert. Abstr.

N79-12918 Texas Technological Univ., Lubbock.
A FAR INFRARED STUDY OF TRANSMUTATION-DOPED GERMANIUM USING FOURIER TRANSFORM SPECTROSCOPY Ph.D. Thesis
Billy Charles Covington 1978 90 p
Avail: Univ. Microfilms Order No. 7819887

The average absorption coefficients, at intervals of 10/cm in the region 20 - 110/cm, are determined for germanium samples with gallium concentration varying from 0.98 x 10 to the 15th power/cu cm to 9.26 x 10 to the 15th power/cu cm. The functional dependence of the absorption coefficients on concentration and frequency is discussed and interpretation of the absorption processes occurring in the 20 - 110/cm region are given. The mechanisms that produce impurity line broadening are discussed and the amount of line broadening for the gallium D line is determined as a function of increasing impurity concentration. Dissert. Abstr.

N79-12919 Wesleyan Univ., Middletown, Conn.
MAGNETIZATION AND COERCIVITY IN AMORPHOUS AND CRYSTALLINE FERROMAGNETS Ph.D. Thesis
Mely Chen Chi 1978 94 p
Avail: Univ. Microfilms Order No. 7820172

A computer simulation technique is used to study the magnetic field behavior of a model for an amorphous ferromagnet with large random single ion anisotropy. It consists of classical spins with Heisenberg exchange interactions between near neighbors. The spins are taken as unit vectors. The local uniaxial anisotropy fields are randomly distributed in direction but with the same magnitude for all sites. An interior portion of the dense random packing model of Finney including 996 atoms is used to give the positions of the different sites. The boundary conditions are quasiperiodic. A similar computer simulation technique is also used to study the intrinsic coercivity of a thin (approximately a few atomic layers) domain wall in perfect ferromagnetic crystals, and the domain wall pinning due to the existence of different kinds of defects. Dissert. Abstr.

N79-12920 Washington State Univ., Pullman.
ELECTRICAL RESPONSE OF A BIMETALLIC JUNCTION TO SHOCK COMPRESSION Ph.D. Thesis
Douglas Dean Bloomquist 1978 138 p
Avail: Univ. Microfilms Order No. 7820077

The electrical response of a copper-constantan junction to shock compression was studied over a pressure range from 145 kbars to 360 kbars. Four possible sources of anomalous response were found: (1) electrical noise due to circuit closure at impact; (2) shock demagnetization of a ferromagnetic material; (3) high local temperature at the junction interface due to shock compression of a surface damage layer; and (4) two-dimensional flow in the pressurized region due to pressure relief from the edges. Using a diffusion welded junction the emf measured was within 20 percent of the predicted emf based on normal thermocouple response to shock compression temperatures. In

a geometry in which a guard ring was used to maintain the pressure behind the shock front, the observed voltage-time profile was a step with constant plateau. Dissert. Abstr.

N79-12921 Colorado Univ. at Boulder.
BRILLOUIN SCATTERING IN NONCOMMENSURATE BaMnF4 Ph.D. Thesis
Daniel Wayne Bechtle 1978 156 p
Avail: Univ. Microfilms Order No. 7820485

A frequency-dependent elastic anomaly in BaMnF4 is discussed from the point of view of interaction of the elastic mode with a soft relaxation mode. The size of the anomaly is explored at near-forward angles and, with the aid of the ultrasonic data, the relaxation time of the overdamped mode is determined both below the transition temperature and at the transition temperature itself. A normalized interaction is determined. The two parameters are found from a fit of the frequency-dependent anomaly size to a model of the interaction spectrum. The spectrum, with the parameters set, is used to predict the temperature and frequency dependences of the intensity and half-width of the scattered spectrum. The dependences are found to be in agreement. The model also predicts a temperature dependence of a central mode intensity and half-width arising from the overdamped nature of the the relaxation mode. Dissert. Abstr.

N79-12922 Purdue Univ., Lafayette, Ind.
THEORY OF ELECTROMAGNETIC GENERATION OF ULTRASOUND AND MAGNETO-TRANSPORT IN NEARLY-FREE-ELECTRON METALS Ph.D. Thesis
Niranjan Chandra Dutta Banik 1978 138 p
Avail: Univ. Microfilms Order No. 7821413

A theory of the anomalous electromagnetic generation of ultrasound in metals is presented. It is applied to explain the data on aluminum. It has the potentiality of doing the same in other metals including potassium. One new element in the theory is the inclusion of a Bragg-reflection force on the lattice. Exact expressions of the force are derived in the case of electrons and holes which are characterized by an isotropic, effective mass. Effects of this force on related phenomena, ultrasonic attenuation and heliconphonon interaction are also discussed. It is also shown that a hole-type Fermi surface can by itself cause the field dependent Hall coefficient that is observed in these metals. Analytic expressions are derived for the conductivity tensor elements in the case of a few idealized hole-orbits. A dynamic-two-carrier model that allows the effective number of electrons and holes to depend on the field is formulated. Dissert. Abstr.

N79-12923 Texas Technological Univ., Lubbock.
ATTENUATION OF ELASTIC SURFACE WAVES IN THIN FILMS OF SUPERCONDUCTING ZINC Ph.D. Thesis
Wayne Elbert Bailey 1978 105 p
Avail: Univ. Microfilms Order No. 7819882

The attenuation of 90 MHz acoustic surface waves in zinc thin films was measured in the temperature region around the superconducting transition temperature. Films of 3000A and 10,000A were evaporated, with the use of an Electron Beam Gun, onto lithium niobate substrates. These acoustic surface waves were generated and detected using interdigital transducers, with a fundamental frequency of 90 MHz, at either end of the Y-cut, Z propagating, lithium niobate substrate. The analysis of the data was presented using the Bardeen, Cooper, and Schriefer theory of superconductivity, and values of the effective energy gap were calculated. Dissert. Abstr.

N79-12924 Cincinnati Univ., Ohio.
INFLUENCE OF LOCAL PINNING INTERACTIONS ON THE FLUX FLOW PROPERTIES OF TYPE 2 SUPERCONDUCTORS Ph.D. Thesis
Fawwaz Nassouh Habbal 1978 315 p
Avail: Univ. Microfilms Order No. 7821570

The critical current, the pinning force, the V- characteristics, and the flux flow noise power were measured in Pb(80)1n(20) and Pb(87.1)Sn(12.9) samples with different metallurgical histories. Variations of the critical current and the pinning force in the Pb1n samples were sensitive to the initial condition of the ingot. Correlations were observed between the change in the strength of the pinning interaction as measured by the critical current and the flux flow noise voltage. A model is presented which takes into account the presence of local interactions between the moving fluxoids and the pinning centers. In this model, flux bundles are held for finite times by local pinning interactions and the motion of the flux bundles gives rise to a series of pulses. The height of each pulse depends on the bundle size, the time of the motion between pinning centers as well as the distance the flux bundles moves between pinning centers. The critical current and the V-1 characteristics are shown to depend upon the field history, the current history, and the orientation history of the flux line lattice. A model explaining the observed hysteresis is presented. Dissert. Abstr.

N79-12925 California Univ., Riverside.
NUCLEAR RELAXATION AND SUPERCONDUCTING FLUCTUATIONS IN SMALL ALUMINUM PARTICLES Ph.D. Thesis
Ping Kwan Tse 1978 152 p
Avail: Univ. Microfilms Order No. 7821372

Aluminum-27 nuclear spin-lattice relaxation times were measured in the normal and superconducting states of aluminum particles having average diameters ranging between 170 A and 750 A. The particles, formed by a gas evaporation technique, were well characterized and were uniform in size when their average diameters were smaller than 400 A. Experiments were performed at temperatures between 0.5 and 4.2 K. Results obtained at magnetic fields of 0 Oe, 10 Oe, 100 Oe, 150 Oe, and 1,200 Oe are discussed. Dissert. Abstr.

N79-12926 Rhode Island Univ., Kingston.
BAND STRUCTURE OF SOLIDS: THE EFFECTS OF ELECTRIC FIELD AND DISORDER Ph.D. Thesis
A. Vaidyanathan 1978 178 p
Avail: Univ. Microfilms Order No. 7820594

The effects of strong electromagnetic radiation on the electrons of crystalline solids, and the effects of structural disorders on their electronic energy band structures were investigated. The two-photon absorption coefficients of several direct-gap semiconductors at typical laser wavelengths were calculated using theoretical models based on second-order time dependent perturbation theory, and the Keldysh formulation. The first-order perturbation theory of one-photon absorption was reexamined and a new formula for the absorption coefficient was derived. The absorption spectra of InSb and GaAs were calculated as well as the electronic energy band structures of cubic BN, rhombohedral As, and trigonal Se and Te and the optical constants of the disordered solids. Dissert. Abstr.

N79-12927 California Univ., Riverside.
THE EFFECT OF PARTICLE COUPLING ON LOCAL ELECTRONIC PROPERTIES OF SUPERCONDUCTING SMALL PARTICLES Ph.D. Thesis
Richard Curtis Ward 1978 168 p
Avail: Univ. Microfilms Order No. 7821375

The possibility of Josephson tunneling between superconducting small particles is examined. The Josephson coupling between the particles, which results from tunneling of Cooper pairs, is inserted into a modified Ginzburg-Landau free energy. The local electronic properties, the effective gap delta and the order parameter relaxation rate gamma, are calculated in the Hartree approximation of this coupling free energy. It is demonstrated that the expression for the nuclear spin lattice relaxation time T sub 1 for superconducting small particles in an applied magnetic field should not depend explicitly on the pair breaking energy. The nuclear spin lattice relaxation time is calculated using the results for delta and gamma obtained for eight coupled particles. The significant result is that the effect of coupling and magnetic field nearly removes the size dependence of T sub 1 below T sub 0. Dissert. Abstr.

N79-12928 Kent State Univ., Ohio.
DEUTERIUM MAGNETIC RESONANCE STUDIES OF ORIENTATIONAL ORDER IN THE LIQUID CRYSTALLINE PHASES Ph.D. Thesis
Philip James Bos 1978 206 p
Avail: Univ. Microfilms Order No. 7821076

The effects of molecular orientational order and conformation changes on the deuterium spectral splitting is considered for several thermotropic liquid crystalline compounds. An analysis

is offered which allows the separation of these two effects on the temperature dependence of the spectral splittings. It is demonstrated that this dependence can be explained solely in terms of orientational order parameters throughout the temperature range of each phase studied as well as at the phase transitions studied. It is found that in addition to the usual order parameter another order parameter is required in the nematic, smectic A, and smectic B phases. A third order parameter is necessary for the description of molecular order in the smectic C phase. The temperature dependence of these three order parameters is given. Furthermore, measurements of the orientational order parameters related to the biaxiality of the smectic C phase are presented. Dissert. Abstr.

N79-12929 Stanford Univ., Calif.
QUANTUM-MECHANICAL FEW-BODY SCATTERING EQUATIONS WITH HALF-ON-SHELL ENERGY-INDEPENDENT SUBSYSTEM INPUT Ph.D. Thesis
Enrique Zeiger 1978 93 p
Avail: Univ. Microfilms Order No. 7822596

Equations for three and four body scattering, within the context of nonrelativistic quantum mechanics and a Hamiltonian scattering theory are presented. For the three body case Faddeev type equations were studied which, although obtained from the rigorous Faddeev theory, only require two body bound state wave functions and half-off-shell transition amplitudes as input. In addition, their effective potentials are independent of the three-body energy, and can easily be made real after an angular momentum decomposition. The equations are formulated in terms of physical transition amplitudes for three body processes, except that in the breakup case the partial wave amplitudes differ from the corresponding full amplitudes by a Watson final state interaction factor. Dissert. Abstr.

N79-12930 Texas Univ. at Dallas.
ENERGY BAND STRUCTURE OF CALCIUM-OXIDE CRYSTALS AND THE ELECTRONIC STRUCTURE OF THE F CENTER IN CaO AND LiF CRYSTALS BY THE METHOD OF LINEAR COMBINATION OF ATOMIC ORBITALS Ph.D. Thesis
Uma Singhal Seth 1978 119 p
Avail: Univ. Microfilms Order No. 7824329

A self consistent field calculation of the energy band structure of a calcium oxide crystal gives an energy gap at the gamma point of 5.93 eV in comparison with the experimental value of 7.03 eV. The initial potential for determining the electronic structure of the F center in a CaO crystal is constructed by assuming that the charge distribution of the Ca(++) and O(--) ions remains the same as in a perfect crystal, even when the F center electrons are introduced. The electronic structure of the relaxed excited states of the F center in a lithium fluoride crystal were studied by writing the Hamiltonian as the difference between the F center crystal Hamiltonian and a term corresponding to relaxation of the nearest neighbor ions. Dissert. Abstr.

N79-12931 Utah Univ., Salt Lake City.
HARTREE-FOCK STUDIES OF METALLIC HYDROGEN AND LITHIUM Ph.D. Thesis
James Douglas Pack 1978 82 p
Avail: Univ. Microfilms Order No. 7822816

Hartree-Fock formalism is applied to cubic metallic hydrogen and lithium crystals. LCAO Bloch functions of Slater-type orbitals are cast into a reciprocal space formulation which simplifies the calculation and rigorously treats the exchange and long-range cancellation features of the electrostatic energy. Brillouin zone integrations are performed by a method developed within this research group. The inclusion of 2p orbitals in the basis yields lower total energies than similar calculations. The Compton profile of lithium is narrower than experimental measurements indicate. The calculated bulk modulus of lithium is somewhat higher than the experimental measurement. The Fermi surface anisotropy of lithium is much smaller than indicated by local exchange calculations and is more closely aligned with experimental findings. Dissert. Abstr.

N79-12932 Princeton Univ., N. J.
THE CONSTANT MOMENTUM TRANSFER AVERAGING TECHNIQUE APPLIED TO THE DETERMINATION OF THE SURFACE STRUCTURE OF GaAs(110) Ph.D. Thesis
Antoine Kahn 1978 102 p
Avail: Univ. Microfilms Order No. 7823522

A Constant Momentum Transfer Averaging (CMTA) technique was developed to recover, from the intensity data, the single scattering, or kinematic, contribution and eliminate the multiple scattering, or dynamical, contribution, thus making the much simpler kinematic analysis applicable to surfaces. The kinematic theory and the scattering formalism are reviewed. A detailed description of the CMTA theory and experimental method is given. Theoretical problems and limitations are mentioned. This technique is then applied to the determination of the atomic structure of GaAs(110). In addition to verifying earlier models of the top layer atomic displacement for which the Ga (As) sublattice is displaced downward (upward), atomic displacements of opposite directions in the first and second subsurface layers are found to be necessary in order to describe adequately the LEED intensity data. Dissert. Abstr.

N79-12933 Stanford Univ., Calif.
FLUX TRAPPING AND SHIELDING IN IRREVERSIBLE SUPERCONDUCTORS Ph.D. Thesis
David Joseph Frankel 1978 246 p
Avail: Univ. Microfilms Order No. 7822504

Movable Hall probes were used to measure fields near or inside Pb, Nb, Pb-B1, Nb-Sn, and Nb-Ti samples of various shapes. The trapping of transverse multiple magnetic fields in tubular samples was accomplished by cooling the samples in an applied field and then smoothly reducing the applied field to zero. Transverse quadrupole and sextupole fields with gradients of over 2000 G/cm were trapped with typical fidelity to the original impressed field of a few percent. Transverse dipole fields of up to 17 kG were also trapped with similar fidelity. Shielding experiments were carried out by cooling the samples in zero field and then gradually applying to external field. Flux trapping and shielding abilities were found to be limited by two factors, the pinning strength of the material, and the susceptibility of a sample to flux jumping. The trapping and shielding behavior of flat disk samples in axial fields and thin-walled tubular samples in transverse fields was modeled. Dissert. Abstr.

N79-12934 Washington Univ., Seattle.
MONOLAYER HELIUM ADSORBED ON RARE GAS PLATED GRAPHITE: A HEAT CAPACITY STUDY Ph.D. Thesis
Selden B. Crary 1978 130 p
Avail: Univ. Microfilms Order No. 7824447

The heat capacity of monolayer helium-4 adsorbed on argon-plated and neon-plated graphite was measured in the temperature range from 0.1 to 4.0 Kelvin. In the areal density range below one-half monolayer, heat capacity peaks are observed which are similar in character to the peaks observed using unplated graphite and which have been attributed to a two-dimensional liquid-gas phase transition. Rare gas plating is seen to dramatically alter the condensation temperature of the helium film. With argon plating a factor of two shift in the condensation temperature is observed, and with neon plating the temperature is reduced to approximately one-half its value on unplated graphite. The shifts in both cases are reviewed with a law of corresponding states framework and effective masses were assigned on the basis of the observed shifts in the maxima of the specific heats. Dissert. Abstr.

N79-12935 Tennessee Univ., Knoxville.
RADIATION FROM Ag AND K FILMS BOMBARDED BY LOW ENERGY ELECTRONS Ph.D. Thesis
Myung Sai Chung 1978 98 p
Avail: Univ. Microfilms Order No. 7823315

Photon spectra from metallic films irradiated by low energy electrons (10-1500 eV)were investigated. Both radiative and nonradiative plasmon modes were studied. For silver films two peaks were resolved when the films were very smooth. One, at 3.73 eV the bulk plasmon energy, is thought to be ordinary transition radiation which results from the decay of plasmon modes directly coupled to the external electromagnetic field. The second, at about 3.60 eV, is very sensitive to surface roughness-coupled radiation from nonradiative surface plasmons. The intensity of the surface plasmon radiation was measured as a function of the incident electron energy for energies between

100 eV and 1200 eV and was found to have a linear dependence. For potassium films bulk and surface plasmon radiation peaks were observed at 3.83 eV and 2.82 eV, respectively.
Dissert. Abstr.

N79-12936 California Univ., Davis.
THE LONG WAVELENGTH VIBRATIONS OF THE BERYLLIUM OXIDE LATTICE Ph.D. Thesis
David Alexander Angst 1978 203 p
Avail: Univ. Microfilms Order No. 7822627

The complete Raman spectra of BeO for phonons propagating along all three principal propagation directions are presented. Two different theoretical treatments are developed for calculating the vibrational frequencies and polarizations of the lattice normal modes, one macroscopic and one microscopic. All the independent parameters which appear in the macroscopic model are computed. A proof is presented that the transversely polarized infrared-active vibration frequencies are related by the microscopic and macroscopic model sum rules. It is experimentally verified that the relationship is valid to within one percent in BeO. The BeO optical frequencies are classified according to a group theoretical classification scheme which is compatible with Maxwell's Equations. A demonstration is presented that the microscopic model, the macroscopic model, and the group theoretical frequency classification scheme are in complete agreement with each other. Dissert. Abstr.

N79-12937# General Electric Co., Schenectady, N. Y. Corporate Research and Development.
TRANSPORT PROPERTIES OF METAL OXIDES IN THE PRESENCE OF SULFUR Final Scientific Report, 1 Jan. 1975 - 31 Dec. 1977
H. S. Spacil and D. A. Shores Jun. 1978 57 p refs
(Contract F44620-75-C-0043; AF Proj. 2306)
(AD-A059000; SRD-78-081; AFOSR-78-1144TR) Avail: NTIS HC A04/MF A01 CSCL 20/12

The electrical conductivities of polycrystalline NiO, single crystal NiO, and single crystal CoO were measured to determine: (1) the effect of SO2 in O2 SO2 mixtures on conductivity, and (2) the effect of exposure to SO2 on defect diffusivity. Only the single crystal oxides proved to be satisfactory for measurement. Small conductivity increases of the order of 1% were found on exposure to SO2. Diffusivity measurements agreed well with literature values for sulfur-free specimens, and indicated the presence of a sulfur-induced defect having a diffusivity no more than an order of magnitude less than that of cation vacancies in specimens that had been exposed to SO2. Mechanisms that might cause an increase in sulfur activity or chemical potential during oxidation of metals are considered. A sulfur-induced defect consisting of S(--) ions on cation sites is postulated as being consistent with the observations, and it is shown that such a defect can lead to an increase in sulfur activity at the metal/oxide interface of a growing oxide. Supplementary thermogravimetric measurements indicated a sulfur solubility in CoO of about 0.05 mole percent. Author (GRA)

N79-12938# Virginia Univ., Charlottesville. Dept. of Materials Science.
MICROSTRUCTURAL OBSERVATIONS ON HIGH STRENGTH POLYCRYSTALLINE IRON WHISKERS
H. G. F. Wilsdorf, Osman T. Inal, and Lawrence E. Murr Aug. 1978 24 p refs
(Contract N00014-75-C-0691)
(AD-A058027; UVA/525321/MS78/102) Avail: NTIS HC A02/MF A01 CSCL 20/2

Polycrystalline iron whiskers produced by chemical vapor decomposition in the presence of a magnetic field have been investigated in regard to their microstructure and composition by transmission electron microscopy, field ion microscopy, and by X-ray and electron diffraction techniques. It was found that the whiskers consisted of a unique and complex microdispersion of iron oxides, iron carbide, and atomic carbon which bond the very small alpha-iron crystallites into a non-porous microstructure of high integrity. The mixing of strong covalent bonding with metallic bonding is proposed to explain the exceptionally high tensile strength of the whiskers. Author (GRA)

N79-12939# Philips Labs., Briarcliff Manor, New York.
DEVELOPMENT AND VERIFICATION OF PYROELECTRIC MATERIALS WITH LOW THERMAL DIFFUSIVITY Final Technical Report, 15 Apr. - 15 Dec. 1977
G. M. Loiacono and J. P. Dougherty May 1978 67 p refs
(Contract DAAK70-77-C-0098)
(AD-A058034) Avail: NTIS HC A04/MF A01 CSCL 20/2

The growth of TGS, DTGS, TGFB and DTGFB crystals from solutions containing Cd, Zn, Cu and Pd impurities (5 mole % level) has resulted in improved properties of these pyroelectric materials. Specifically, the optical quality and machinability of Zn and Cd doped crystals improved significantly. The thermal diffusivity and specific heat of the doped crystals were reduced by 10% and 25%, respectively. The effectiveness of the dopants can be classified as Cd = Cu = Zn = Pd. The evidence is clear that metal dopings do effect the thermal properties of these crystals even at the low concentrations incorporated into the host crystals. Further investigations at higher doping levels of both metallic and organic compounds are warranted. Samples of the doped crystals were supplied. Author (GRA)

N79-12940# National Bureau of Standards, Washington, D. C.
SEMICONDUCTOR TECHNOLOGY PROGRAM, PROGRAM BRIEFS Interim Report, Jan. - Mar. 1978
W. Murray Bullis Jul. 1978 13 p refs Sponsored in cooperation with DNA, Charles Stark Draper Lab., Army Electron. Res. and Develop. Command, and AFAL
(Contracts EX-77-A01-6010; DL-H-139485; N00030-78-C-0100; ARPA Order 2397)
(PB-284478/5; NBSIR-78-1444-2) Avail: NTIS HC A02/MF A01 CSCL 20L

The following topics are discussed: (1) profiling the Si-SiO2 interface; (2) detection of cracks in solar cells; (3) gated diodes and CCD dark current; (4) silicon resistivity SRMs; (5) unintentional ion channeling effects; (6) deep level measurements; (7) transferability of SOA test circuits; (8) acoustic material signatures; (9) availability of test pattern NBS-4; (10) moisture measurement workshop; (11) SPV-FCD lifetime comparison;and (12) new projects. GRA

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N79-12941 Yale Univ., New Haven, Conn.
APPLICATIONS OF SOME GRADED LIE GROUPS TO THE STUDY OF NONLINEAR SUPERSYMMETRIC LAGRANGIANS Ph.D. Thesis
Louis Marchildon 1978 115 p
Avail: Univ. Microfilms Order No. 7820163

The formalism of spontaneous symmetry breaking in gauge theories and the theory of nonlinear invariant Lagrangians are reviewed, with an emphasis on the relationships between the two. The graded conformal group SU(2,2/1) is introduced as a set of transformations leaving a given bilinear form invariant, and it is shown that a general element of SU(2,2/1) can be written as the product of an odd transformation (i.e., one that changes Bose into Fermi coordinates) times an even one. Two subgroups of SU(1,2/1) are then extracted and characterized. The finite transformation properties of the covariant derivatives are obtained from nonlinear representations used to build Lagrangians which exhibit local nonlinear gauge invariance under GP or OSp(1/4). The Lagrangian of supergravity can be expressed in terms of these invariants. Dissert. Abstr.

N79-12942 Boston Univ., Mass.
QUANTUM-DYNAMICAL SYMMETRY GROUPS IN CURVED SPACES Ph.D. Thesis
John Richard Haavisto 1978 125 p
Avail: Univ. Microfilms Order No. 7820181

The non-vanishing vacuum expectation value of the energy density arising from the spontaneous symmetry breaking in completely unified Yang-Mills–Einstein-Higgs type gauge theories is used to conclude that space-time is strongly curved locally. These localized regions with hadrons are identified. The locality principle in these curved spaces is applied to the quantum mechanical dynamic symmetry groups characterizing internal excitations. Confinement and non-zero triality are examined. Infinite dimensional wave equations are constructed to describe the relativistic hadrons with quantized masses. Dissert. Abstr.

N79-12943 California Univ., Los Angeles.
HEAT TRANSFER BY NATURAL CONVECTION IN ENCLOSED RECTANGULAR CAVITIES Ph.D. Thesis
James Norman Arnold 1978 174 p
Avail: Univ. Microfilms Order No. 7820184

Attempts are made to see how the size of the rectangular cavity affects the heat transfer, and to see if a three-dimensional Galerkin procedure can be used to predict the heat transfer within the closed rectangular cavities. Rectangular regions of varying W/L, D/L, and angle of inclination were tested for vertical, horizontal, and tilted orientation. Values of D/L between 1 and 12 were paired with values of W/L between 0.25 and 10. It is shown that for high D/L cells, W/L is the parameter affecting heat transfer for all 3 orientations. However, for low D/L cells, the parameter affecting Nusselt Number in the vertical orientation was found to be W/D, not W/L. A three-dimensional numerical approximation was found to agree well with experimental results. Both two- and three-dimensional predictions appear to work well at Nu less than 2. Dissert. Abstr.

N79-12944 Texas Univ. at Dallas.
ON THE GENERATION OF EXACT SOLUTIONS TO THE EINSTEIN FIELD EQUATIONS FOR HOMOGENEOUS SPACETIME Ph.D. Thesis
Robert Etsuo Hiromoto 1978 133 p
Avail: Univ. Microfilms Order No. 7824328

A formalism capable of finding all homogeneous solutions of the Eistein field equations with an arbitrary energy-stress tensor is presented. Briefly, the method involves the classification of the four-dimensional Lie algebra over the reals into nine different broad classes, using only the Lorentz group. The approach is to use utilize the geometrical considerations of the homogeneous spacetime and field equations to be solved. To test the method, it is applied to the case of vacuum and all possible homogeneous vacuum solutions to the Einstein field equations are found. Dissert. Abstr.

N79-12945# Battelle Columbus Labs., Ohio.
COMPUTATIONAL STUDY OF CHEMICAL REACTION DYNAMICS: QUANTUM STUDY OF SELECTED ATOM-DIATOMIC MOLECULE REACTIONS INVOLVING HYDROGEN, OXYGEN, AND NITROGEN Final Report, 1 Jun. 1976 - 31 May 1978
George Wolken, Jr. 14 Jul. 1978 56 p refs
(Contract DAAG29-76-C-0048)
(AD-A057457; ARO-13600.2-CX) Avail: NTIS HC A04/MF A01 CSCL 07/4

The natural collision coordinate theory of quantum reactive scattering was generalized to reactions of the form AB+C in which the reaction intermediate could be nonlinear. An approximation to the NCC kinetic energy operator was employed which systematically reduces to that of Wyatt when applied to a linear intermediate. A scattering code developed previously was modified to compute the many additional terms required in the kinetic energy. The resulting code is the present state-of-the-art in the application of quantum reactive scattering theory to general bimolecular reactions. The new code was tested by application to the H + H2 and F + H2 reactions, and then applied to the H + O2 combustion reaction. As will be seen below, many new results were obtained which should aid our understanding of microscopic processes, many of which are difficult to study experimentally. Author (GRA)

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N79-12946# National Technical Information Service, Springfield, Va.
MANAGEMENT BY OBJECTIVES. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Aug. 1978
Mary E. Young Sep. 1978 72 p Supersedes NTIS/PS-77/0892
(NTIS/PS-78/0976/7; NTIS/PS-77/0892) Avail: NTIS HC $28.00/MF $28.00 CSCL 05A

The bibliography cites studies relating to the philosophy of MBO (Management by Objectives), as well as positive and negative factors where MBO has been implemented. Case studies of implementation include health care planning, urban planning, local governments, housing, military management, R & D organizations, etc. GRA

N79-12947# Advisory Group for Aerospace Research and Development, Paris (France).
SUGGESTED DATA ELEMENTS FOR RECORDING ONGOING RESEARCH AND DEVELOPMENT EFFORTS: A MANAGEMENT INFORMATION SYSTEM
H. E. Sauter (DDC, Alexandria, Va.) Oct. 1978 11 p refs
(AGARD-R-669; ISBN-92-835-1298-7) Avail: NTIS HC A02/MF A01

Data elements integral to a Research and Development Management Information System are gathered from a sampling of operating systems, listed, and defined. A work unit level of reporting is defined, and its advantages are given. Working groups are established to develop a standardization of data elements. S.E.S.

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software*.

N79-12948# National Technical Information Service, Springfield, Va.
ON-LINE INFORMATION RETRIEVAL SYSTEMS, VOLUME 2. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1977 - Aug. 1978
Mary E. Young Sep. 1978 79 p Supersedes NTIS/PS-77/0817; NTIS/PS-76/0755; NTIS/PS-75/513
(NTIS/PS-78/0979/1; NTIS/PS-77/0817; NTIS/PS-76/0755; NTIS/PS-75/513) Avail: NTIS HC $28.00/MF $28.00 CSCL 05B

This bibliography cites reports describing the structure and development of on-line information retrieval systems. Instructions for their use are given and operating networks are compared. Of the 73 abstracts included, 36 are new entries to the previous edition. GRA

N79-12949 Cincinnati Univ., Ohio.
THE APPLICATION OF CLUSTER ANALYSIS TO THE DIRECT RETRIEVAL OF COMPUTERIZED INFORMATION Ph.D. Thesis

Thomas Connor Schaber 1978 144 p
Avail: Univ. Microfilms Order No. 7821594

A generalized approach to the selection of a method for storing/retrieving data in/from a computer which will result in the least expenditure of resources, human and computer, as compared to current access methods is discussed. A case is made for the existence of clustered data sets and an access method utilizing knowledge about a clustered data set was designed and built. The clustered direct access method (CDAM), is able identify clusters in a key set and, given an estimate of the computer's resource costs, build an access method customized to the particular clustered key set. Although CDAM builds a table in core the number of entries in the table is a function of the number of clusters in the key set and the relative cost of the computer's resources. Thus for certain key sets the number of entries in the table is less than it would be for the well known indexed access method. Dissert. Abstr.

N79-12950*# BioTechnology, Inc., Falls Church, Va.
INFORMATION REQUIREMENTS OF THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION'S SAFETY, ENVIRONMENTAL HEALTH, AND OCCUPATIONAL MEDICINE PROGRAMS
Adrienne A. Whyte May 1978 134 p refs
(Contract NASw-3119)
(NASA-CR-157945) Avail: NTIS HC A07/MF A01 CSCL 05B

A survey of the internal and external reporting and recordkeeping procedures of these programs was conducted and the major problems associated with them are outlined. The impact of probable future requirements on existing information systems is evaluated. This report also presents the benefits of combining the safety and health information systems into one computerized system and recommendations for the development and scope of that system. G.G.

N79-12951*# SRI International Corp., Menlo Park, Calif.
SUGGESTED APPROACH FOR ESTABLISHING A REHABILITATION ENGINEERING INFORMATION SERVICE FOR THE STATE OF CALIFORNIA
Lo F. Christy, Gail Kelton-Fogg, Ruth Lizak, and Cynthia Vahlkamp Sep. 1978 250 p refs Sponsored in part by California State Dept. of Rehabilitation
(Contract NAS2-9846; SRI Proj. MEU-7171)
(NASA-CR-152198) Avail: NTIS HC A11/MF A01 CSCL 05B

An ever expanding body of rehabilitation engineering technology is developing in this country, but it rarely reaches the people for whom it is intended. The increasing concern of state and federal departments of rehabilitation for this technology lag was the stimulus for a series of problem-solving workshops held in California during 1977. As a result of the workshops, the recommendation emerged that the California Department of Rehabilitation take the lead in the development of a coordinated delivery system that would eventually serve the entire state and be a model for similar systems across the nation. G.Y.

N79-12952*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NSSDC DATA LISTING
Sep. 1978 34 p
(NASA-TM-79762) Avail: NTIS HC A03/MF A01 CSCL 05B

The National Space Science Data Center (NSSDC) Data Listing is in an abbreviated form compared to the data catalogs normally published by NSSDC/WDC-A-R&S. It is organized by NSSDC spacecraft common name. The launch date and NSSDC ID are printed for each spacecraft. The experiments are listed alphabetically by the principal investigator's name and NSSDC ID are printed for each experiment. The data sets are listed by NSSDC ID following the experiment name. The data set name, data form code, quantity of data, and the time span of the data as verified by NSSDC are printed for each data set. Information on NSSDC facilities and ordering procedures are included. A.R.H.

N79-12953# Naval Postgraduate School, Monterey, Calif.
LOGICAL DATA BASE DESIGN FOR RELATIONAL DATA BASE SYSTEMS M.S. Thesis
Jack Albert Chapman Jun. 1978 63 p refs
(AD-A057902) Avail: NTIS HC A04/MF A01 CSCL 09/2

Theories and guidance for logical data base design have lagged far behind the advances in physical data base design. The advent of sophisticated data base management systems has relieved the user of many of the problems of physical data base design, but has placed more emphasis on good logical design. The theory behind logical data base design is explored and a step by step procedure for the logical data base design is explored and a step by step procedure for the logical data base design is presented, employing mathematical and operations research techniques. Author (GRA)

N79-12954# Stanford Univ., Calif. Electronics Labs.
THE DESIGN OF TREE AND TRELLIS DATA COMPRESSION SYSTEMS
Joseph Linde and Robert M. Gray Feb. 1978 86 p refs
(Contracts F44620-73-C-0065; N00014-75-C-0601)
(AD-A057963; SU-SEL-78-004; SU-TR-6504-2) Avail: NTIS HC A05/MF A01 CSCL 09/2

Recent results in information theory promise the existence of tree and trellis data compression systems operating near the Shannon theoretical bound, but provide little indication of how actually to design such systems. Presented here are several intuitive design approaches and also a general design philosophy based upon the generation of fake processes i.e., finite entropy processes which are close (in the generalized Ornstein distance) to the process one wishes to compress. Most of the design procedures can be used for a wide class of sources. Performance is evaluated, via simulations, for memoryless, autoregressive and moving average Gaussian sources and compared to traditional Data Compression systems. The new schemes typically provide 1-2 dB improvement in performance over the traditional schemes at a rate of 1 bit/symbol. The inevitable increase in complexity is moderate in most cases. GRA

N79-12955# SRI International Corp., Menlo Park, Calif. Naval Warfare Research Center.
AUTOMATED DATA SYSTEMS (ADS) MANAGEMENT METHODOLOGY. VOLUME 2: AUTOMATED DATA SYSTEMS PROJECT EVALUATION METHODOLOGY Final Report
David L. Harvey, Terrance M. Keen, Edward H. Means, William Schubert, and Graham F. Wallace Dec. 1977 46 p refs 2 Vol.
(Contract N00014-76-C-1119; SRI Proj. 5765-4)
(AD-A057915) Avail: NTIS HC A03/MF A01 CSCL 09/2

This document synthesizes and compiles the results obtained under the study tasks. GRA

N79-12956# SRI International Corp., Menlo Park, Calif. Naval Research Center.
AUTOMATED DATA SYSTEMS (ADS) MANAGEMENT METHODOLOGY. VOLUME 1: AUTOMATED DATA SYSTEMS CONCEPT PHASE DOCUMENT PREPARATION METHODOLOGY Final Report
David L. Harvey, Terrance M. Keen, Edward H. Means, William Hubert, and Graham F. Wallace Dec. 1977 132 p 2 Vol.
(Contract N00014-76-C-1119; SRI Proj. 5765-4)
(AD-A057914) Avail: NTIS HC A07/MF A01 CSCL 09/2

The specific objectives of the research were as follows: Operationally define the management and analysis tasks and duties that must be performed in the preparation of an ADS Development Plan; Operationally define a procedural methodology for developing ADS objectives and associated measures of objective fulfillment; Develop specific methodologies needed to guide developers and decision makers for ADS systems so that the anticipated value of the proposed system can be assured and its total cost impact estimated and controlled; and Assist HQMC to translate the study results into procedures and policies. GRA

N79-12957# National Technical Information Service, Springfield, Va.
ON-LINE INFORMATION RETRIEVAL SYSTEMS, VOLUME 1. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - 1976
Mary E. Young Sep. 1978 199 p
(NTIS/PS-78/0978/3) Avail: NTIS HC $28.00/MF $28.00 CSCL 05B

Research is cited on on-line computer systems for retrieval of information. Systems development, formats of large and small systems, instructions for use, and comparisons of operating networks are covered. This updated bibliography contains 193 abstracts, none of which is new to the previous edition. GRA

N79-12958# Illinois Univ. at Urbana-Champaign, Urbana. Coordinated Science Lab.
DATA BASE MAPPING MODEL AND SEARCH SCHEME TO FACILITATE RESOURCE SHARING. VOLUME 1: MAPPING OF CHEMICAL DATA BASES AND MAPPING OF DATA BASE ELEMENTS USING A RELATIONAL DATA BASE STRUCTURE Final Report
Martha E. Williams, Scott E. Preece, Sandra H. Rouse, and Keith MacLaury Dec. 1977 342 p refs 2 Vol.
(Grant NSF SIS-74-18558)
(PB-283892/8; T-56-Vol-1) Avail: NTIS HC A15/MF A01 CSCL 09B

The chemical identifiers used in 161 machine-readable bibliographic numeric, and algorithmic sources of chemical data were studied. Computer programs forming a prototype mapping system were constructed and used to generate indirect linkages joining virtually all pairs of data resources by mapping paths of direct linkages to and among resources that can function as translators, changing the form of the supplied data so they can function as input to the desired data resource or to another translator. A generalized set of data elements capable of containing the majority of information contained in existing data bases was identified. Those data elements were formed into a hierarchical structure of compound and single elements, and the feasibility of automatically mapping existing data bases into that structure was demonstrated. GRA

N79-12959# Illinois Univ. at Urbana-Champaign, Urbana. Coordinated Science Lab.
DATA BASE MAPPING MODEL AND SEARCH SCHEME TO FACILITATE RESOURCE SHARING. VOLUME 2: DIRECTORY OF CHEMICAL DATA BASES Final Report
Martha E. Williams Dec. 1977 446 p 2 Vol.
(Grant NSF SIS-74-18558)
(PB-283893/6; T-56-Vol-2) Avail: NTIS HC A19/MF A01 CSCL 09B

Data describing the format and contents of 161 chemical data bases are presented as a directory of chemical data. Areas included are: (1) basic information; (2) producer/distributor/generator information; (3) availability and charges for data base tapes; (4) subject matter and scope of data on tape; (5) subject analysis indexing data including all types of chemical identifiers used in the data base; (6) bibliographic data base elements on tape; (7) tape specifications; (8) search programs; (9) data base services offered; and (10) user aids offered by data base producer. GRA

N79-12960# New York Univ., N. Y.
RESEARCH MANAGEMENT AND COMPUTER USE Final Report
Eleazer Bromberg 1978 177 p
(Grant NSF RMI-74-12767)
(PB-283648/4) Avail: NTIS HC A09/MF A01 CSCL 05A

Three systems developed to meet research management needs at NYU are discussed. The Faculty Research Interest Inventory is a computerized system for matching research interests to faculty members' names. The Computerized Checkbook simplifies planning and bookkeeping for both project directors and central fiscal offices. The Cost Analysis of Organized Research program provides a reasonable quantitative estimate of the costs of the various components of the university research enterprise. The methodology for each of these systems is described. GRA

N79-12961# Northwestern Univ., Evanston, Ill. Vogelback Computing Center.
PROFILE EVALUATION, RESEARCH AND MODELLING FOR SCIENCE INFORMATION SYSTEMS: A REPORT ON THE DEVELOPMENT OF A GENERALIZED EVALUATION METHODOLOGY TO STUDY USER INTERACTION Final Report, 1 Sep. 1976 - 28 Feb. 1978
Lorraine Borman and W. Dominick (Louisiana Southwestern Univ., Lafayette) Jun. 1978 258 p
(Grant NSF DS-176-19481)
(PB-283979/3; VCC/ISS-78/001) Avail: NTIS HC A12/MF A01 CSCL 05B

The behavioral and performance patterns of individuals using interactive information systems were studied to identify factors which serve to improve use of such systems and develop a generalized evaluation methodology. Data collection was accomplished through automated interaction monitors within two information systems at different universities, with many data bases and a broad user community. A series of questions covered such factors as system usage, errors and error recoveries, user experience, and success and satisfaction with the system. The methodology consisted of defining the evaluation objectives, isolating monitoring parameters, constructing behavior indicators, and performing statistical analyses. GRA

N79-12962# Sigma Data Computing Corp., Rockville, Md.
A STUDY OF SYSTEM REQUIREMENTS FOR IMPLEMENTING A CHEMICAL SUBSTANCES INFORMATION NETWORK Final Report
Oct. 1977 211 p refs Sponsored in part by EPA and Natl. Library of Med.
(Contract EQ4AC003)
(PB-284030/4; CS-101) Avail: NTIS HC A10/MF A01 CSCL 05B

Specifications for the Chemical Data Bases Directory and the Chemical Structure/Nomenclature System are discussed. Current computer security techniques for protecting confidential data are reviewed and methods for meeting the requirements of EPA's Office of Toxic Substances and their integration with the proposed Chemical Substances Information Network are explored. GRA

N79-12963# Case Western Reserve Univ., Cleveland, Ohio. School of Library Science.
AN INTEGRATED THEORY OF INFORMATION TRANSFER Final Report, 1 Sep. 1975 - 28 Feb. 1978
William Goffman May 1978 28 p refs
(Grant NSF SIS-75-19725)
(PB-284114/6) Avail: NTIS HC A03/MF A01 CSCL 05B

A general model of the process of communication, based on the notion of relevance, defines both structural and dynamic properties of the process in general terms. The interdependent structure of scientific knowledge can be displayed in terms of the basic elements (authors, papers, journals) which are linked together to perform a comprehensive whole, because of its dynamic properties, the model has capabilities of predicting the subsequent nature of these structures and should be possible to construct algorithms identifying authors, papers and journals of quality for any given scientific field. GRA

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N79-12964# Army Construction Engineering Research Lab., Champaign, Ill.
DEVELOPMENT OF THE ECONOMIC IMPACT FORECAST SYSTEM (EIFS): THE MULTIPLIER ASPECTS Final Report
Ronald D. Webster, L. Ortiz, R. Mitchell, and W. Hamilton May 1978 41 p
(DA Proj. 4A7-62720-A-896)
(AD-A057936; CERL-TR-N-35) Avail: NTIS HC A03/MF A01 CSCL 05/3

This report presents refinements to the Economic Impact Forecast System's (EIFS) multiplier calculation that will make it more accurate and user-oriented. Two techniques for meeting National Environmental Policy Act requirements were analyzed, and EIFS was modified according to user needs and cost considerations shown by the analysis. The resultant system compares very favorably with alternative, more expensive,

techniques and can provide the Department of the Army with an efficient methodology for regional economic impact assessment. Author (GRA)

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N79-12965# Kentucky Legislative Research Commission, Frankfort.
PERSONAL INFORMATION AND PRIVACY
Michael Greer and Susan Martin Dec. 1977 280 p
(PB-283779/7; RR-145) Avail: NTIS HC A13/MF A01 CSCL 05B

An overview of personal information and privacy is presented. The extensiveness of information and the complexities of the subject prevented detailed study of specific facets. It is hoped, therefore, that the study will serve a secondary purpose which is to stimulate further study in the area. GRA

N79-12966# National Commission on New Technological Uses of Copyrighted Works, Washington, D. C.
TRANSCRIPT OF NATIONAL COMMISSION ON NEW TECHNOLOGICAL USES OF COPYRIGHTED WORKS MEETING NO. 20
Feb. 1978 173 p Meeting held at New York City, 16-17 Feb. 1978
(PB-283876/1; CONTU-78-0003) Avail: NTIS HC A08/MF A01 CSCL 05B

A transcript is presented of Commission meetings held in New York City on February 16 and 17, 1978. Witnesses were Mr. Theodor H. Nelson, developer of the Xanadu TM Hypertext Network, speaking on copyright protection for computer software, and Mr. Michael Harris, Chairman of the Board of the Copyright Clearance Center, who gave a progress report on the first six weeks operation of the Center. The Commission also adopted the report of the Data Base Subcommittee, discussed the report of the Software Subcommittee, and discussed the draft report of the Photocopy Subcommittee, authorizing a revised draft of that document to be distributed to interested parties in mid-March. GRA

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N79-12967 Water Research Centre, Stevenage (England).
UTILIZATION OF SEWAGE SLUDGE ON LAND. A BIBLIOGRAPHY OF SELECTED REFERENCES COVERING THE PERIOD 1950 - 1977
1978 171 p Conf. held at Oxford, 10-13 Apr. 1978
(WRC-OR-10) Avail: NTIS HC A08

390 references from 1950 onwards cover all the complexities of spreading sewage sludge on agricultural ground. Particular aspects include pretreatment of sludge; effects of sludge on the soil and on plant growth; presence of organisms and metals in sludge; economic aspects; nutritional value; and methods and equipment for the application of sludge to the land. ESA

N79-12968*# Booz-Allen and Hamilton, Inc., Cleveland, Ohio. Design and Development.
PRELIMINARY POWER TRAIN DESIGN FOR A STATE-OF-THE-ART ELECTRIC VEHICLE (EXECUTIVE SUMMARY)
[1978] 119 p
(Contract NAS3-20595)
(NASA-CR-157625) Avail: NTIS HC A09/MF A01 CSCL 13F

The preliminary design of a state-of-the-art electric power train is part of a national effort to reap the potential benefit of useful urban electric passenger vehicles. Outlined in a detailed presentation are: (1) assessment of the state-of-the-art in electric vehicle technology; (2) state-of-the-art power train design; (3) improved power train; and (4) summary and recommendations. G.Y.

N79-12969*# Ford Motor Co., Dearborn, Mich.
EVALUATION OF ADVANCED REGENERATOR SYSTEMS
J. A. Cook, C. A. Fucinari, J. N. Lingscheit, and C. J. Rahnke Aug. 1978 39 p refs
(Contract DEN3-8)
(NASA-CR-159422; DOE/NASA/0008-78/4) Avail: NTIS HC A03/MF A01 CSCL 13F

The major considerations are discussed which will affect the selection of a ceramic regenerative heat exchanger for an improved 100 HP automotive gas turbine engine. The regenerator considered for this application is about 36cm in diameter. Regenerator comparisons are made on the basis of material, method of fabrication, cost, and performance. A regenerator inlet temperature of 1000 C is assumed for performance comparisons, and laboratory test results are discussed for material comparisons at 1100 and 1200 C. Engine test results using the Ford 707 industrial gas turbine engine are also discussed. Author

N79-12970*# Gnostic Concepts, Inc., Menlo Park, Calif.
INDUSTRIALIZATION STUDY Final Report
28 Aug. 1978 194 p
(Contracts NAS7-100; JPL-954899)
(NASA-CR-157953; DOE/JPL-954899-78/3) Avail: NTIS HC A09/MF A01 CSCL 05A

The investment process in U.S. industries was studied in order to characterize the critical elements in major high risk investment decisions. Because motivation was determined to be the greatest single factor force in inducing a company to invest in a high risk venture, the relative impact of alternative government programs and policies on personal and financial motivations were analyzed qualitatively and quantitatively to ascertain the effect on these programs and policies on photovoltaic industrialization. The government alternatives are ranked on the basis of their ease of implementation and their probable effect. The recommended sequence in which government policies would be applied to maximize the industrialization of the photovoltaic venture is discussed. A.R.H.

N79-12971# Naval Postgraduate School, Monterey, Calif.
THE DEVELOPMENT OF A FULLY AUTOMATED PROCEDURE TO PRODUCE A TECHNOLOGY TRANSFER DIRECTORY OF PEOPLE TO FACILITATE THE LINKER FUNCTION IN THE TECHNOLOGY TRANSFER PROCESS M.S. Thesis
Richard Walter Modrowski and Michael Milton Henderson Jun. 1978 197 p refs
(AD-A057905; NPS-54-78-061) Avail: NTIS HC A09/MF A01 CSCL 05/2

The process of technology transfer is dependent on personal communication between individuals knowledgeable in new technology and who are willing to share this knowledge with others for the purpose of increasing the benefits to mankind. This work facilitates the communication process by developing a fully automated system to produce a directory listing of people who comprise this category. Furthermore, the system's computer programs constitute a model by which the process of gathering, storing, extracting and displaying various types of information is made possible. Author (GRA)

N79-12972# Agricultural Research Service, Peoria, Ill. Northern Regional Research Center.
REMOVAL OF HEAVY METALS FROM INDUSTRIAL WASTEWATERS USING INSOLUBLE STARCH XANTHATE Final Report, Jul. 1975 - Jun. 1976
Robert E. Wing, Leo L. Navickis, Brain K. Jasberg, and Warren E. Rayford May 1978 119 p refs
(PB-283792/0; EPA-600/2-78-085) Avail: NTIS HC A06/MF A01 CSCL 13B

The Northern Regional Research Center developed an effective process to remove heavy metals from wastewaters of two

nonferrous metal industries and insoluable starch xanthate (ISX). The bench-scale evaluation of wastewaters from two lead battery and one brass mill waste is presented. The evaluation included: (1) determination of the metals and concentrations in the raw and treated wastewaters; (2) treatment with ISX alone and in combination with selected coagulant aids; (3) recovery of heavy metals from ISX sludge; and (4) determination of the potential reuse of the treated effluent. Several other effective and economical treatment processes were developed for specific waste streams from printed circuit manufacturers. GRA

N79-12973# Dames and Moore, Denver, Colo.
ANALYSIS OF OPERATIONS AND MAINTENANCE COSTS FOR MUNICIPAL WASTEWATER TREATMENT SYSTEMS
May 1978 282 p refs Sponsored by EPA
(PB-283471/1; EPA-430/9-77-015; EPA/MCD-39) Avail: NTIS HC A13/MF A01 CSCL 13B

The results and analyses on the operations and maintenance (O&M) costs of the Nation's municipal wastewater treatment plants and collection systems are reported. The results were derived from actual plant operating records across the continental United States. Costs are presented for different levels of wastewater treatment, types of plants and collection systems, and segregated cost categories. A number of analyses are also presented as relative costs for certain treatment variables and characteristics. The analyses were performed with the assistance of a computer statistical package. GRA

N79-12974*# National Aeronautics and Space Administration. National Space Technology Labs., Bay Saint Louis, Miss.
EXPERIMENTAL MODEL FOR TECHNOLOGY APPLICATIONS AND TRANSFER: AN ANALYSIS. TECHNOLOGY APPLICATION CONSORTIUM
Roy S. Estess 1977 68 p refs Consortium held at Bay Saint Louis, Mo.; sponsored by NASA, State of Louisiana, State of Mississippi, and NSF
(NASA-TM-79931; PB-284358/9; NSF/RA-770568) Avail: NTIS HC A04/MF A01 CSCL 05A

A completed two-year experiment between the states of Mississippi and Louisiana, the National Science Foundation, and NASA, to test the concept of institutionalizing states on a Federal laboratory to enhance the technology transfer process was evaluated. The four basic elements necessary for the technology process; the technology processor/resource, the user or transferee, the transfer mechanism, and the terms and conditions of the transfer are discussed. Factors to be considered if the experiment is to be successfully duplicated elsewhere are examined. NASA will continue to support the residency of the state at the NSTL, offer reimbursable services as available, and conduct specific R&D projects. GRA

N79-12975# National Bureau of Standards, Washington, D. C. Chemical Thermodynamics Data Center.
THERMODYNAMIC DATA FOR WASTE INCINERATION Report, 1 Jan. 1975 - 31 Dec. 1976
Eugene S. Domalski, William H. Evans, and Thomas L. Jobe, Jr. Aug. 1978 169 p refs
(Grant ASME-G-125-5)
(PB-284659/0; NBSIR-78-1479) Avail: NTIS HC A08/MF A01 CSCL 07D

A table of the thermodynamic data of 331 selected materials was compiled for the purpose of providing engineers with information on materials which are not easily indentifiable by a stoichiometric formula. Examples of such materials are foods, wood species, oils, animals, plants polymers, etc. The table is arranged alphabetically according to the names of the various materials, and whenever possible, the chief components or all readily identifiable components are supplied. The physical state, the kind of thermodynamic property, specific property values, and citations to a list of 142 references are furnished. In order to assist the reader with finding a specific material or property, a material name and property index was put together. A section on units and definitions explains the various thermodynamic properties being reported and the condition under which they apply. GRA

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N79-12976 Colorado Univ. at Boulder.
THE MEASUREMENT OF ROTATION, MACROTURBULENCE AND EXPANSION VELOCITIES IN O STAR ATMOSPHERES USING FOURIER TRANSFORM ANALYSIS OF ABSORPTION LINE PROFILES Ph.D. Thesis
Dennis Charles Ebbets 1977 311 p
Avail: Univ. Microfilms Order No. 7820504

The broad absorption lines observed in the spectra of O type stars have long suggested the presence of macroscopic velocity fields. Analyzing line profiles in the Fourier transform domain, allowed a fairly unambiguous separation of the velocity fields to be made. Results show that for stars on the main sequence, little or no turbulence can be detected. For the supergiants, rotation alone cannot simultaneously reproduce the line profiles and their transforms. Macroturbulence, modeled by an isotropic Gaussian distribution of velocities, is needed to produce satisfactory agreement with observations in both domains. Dissert. Abstr.

N79-12977 Yale Univ., New Haven, Conn.
THE STELLAR CONTENT OF DWARF SPHEROIDAL GALAXIES Ph.D. Thesis
Alan William Hirshfeld 1978 172 p
Avail: Univ. Microfilms Order No. 7820143

Stellar content was investigated with emphasis on determining the nature of the anomalous cepheids. These variables, also encountered in the Small Magellanic Cloud and the globular cluster NGC 5466, exhibit a period-luminosity relation which differs from that of normal Population 2 cepheids. It was found that the observations can best be accounted for by ascribing to the anomalous cepheids a mass about 2 to 3 times that of the RR Lyraes in the same systems. Computer models of zero-age horizontal branch positions and horizontal branch evolution of extremely metal-poor stars were constructed. The characteristics of horizontal branch models are discussed with particular emphasis on the upper branch stars. The implications of this study on the formation of the galaxy and the galactic halo are briefly discussed. Dissert. Abstr.

N79-12978 California Univ., Los Angeles.
THE ABUNDANCE OF THE ELEMENTS IN PLANETARY NEBULAE IN THE GALACTIC BULGE Ph.D. Thesis
Christopher Muir Price 1978 173 p
Avail: Univ. Microfilms Order No. 7820280

Extensive photoelectric scans of four very faint planetary nebulae in low absorption windows near the galactic center are obtained. The data indicate that these nebulae have masses of about 0.1 solar mass and reside in the galactic bulge. Three of the four nebulae (M2-23, H1-56, and H1-60) have elemental abundances typical of local planetary nebulae in the galactic disk. The fourth nebula (H1-55) has a normal helium abundance, but the abundances of the heavier elements appear to be at least an order of magnitude higher than normal. This result can be interpreted as evidence for the existence of a population of old super metal rich stars near the galactic center. Dissert. Abstr.

N79-12979*# Texas Univ., Austin. Dept. of Astronomy.
THE MCDONALD OBSERVATORY LUNAR LASER RANGING PROJECT Annual Report, 1 Sep. 1977 - 31 Aug. 1978
E. C. Silverberg Nov. 1978 10 p refs
(Grant NGR-44-012-165)

(NASA-CR-157948) Avail: NTIS HC A02/MF A01 CSCL 03A

A summary of the activities of the McDonald lunar laser ranging station at Fort Davis for the FY 77-78 fiscal year is presented. The lunar laser experiment uses the observatory 2.7m reflecting telescope on a thrice-per-day, 21-day-per-lunation schedule. Data are recorded on magnetic tapes and sent to the University of Texas at Austin where the data is processed. After processing, the data is distributed to interested analysis centers and later to the National Space Science Data Center where it is available for routine distribution. Detailed reports are published on the McDonald operations after every fourth lunation or approximately once every 115 days. These reports contain a day-by-day documentation of the ranging activity, detailed discussions of the equipment development efforts, and an abundance of other information as is needed to document and archive this important data type. G.Y.

N79-12980*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DIRECTORY OF ASTRONOMICAL DATA FILES
Sep. 1978 140 p
(NASA-TM-79761) Avail: NTIS HC A07/MF A01 CSCL 03A

This Directory of Astronomical Data Files was prepared by the Data Task Force of the Interagency Coordination Committee for Astronomy (ICCA) in cooperation with the National Space Science Data Center (NSSDC). The purpose of the Directory is to provide a listing which will enable a user to locate stellar and extragalactic data sources keyed along with sufficient descriptive information to permit him to assess the value of the files for his use as well as the status and availability of the compilations. G.Y.

N79-12981# Arizona Univ., Tucson.
IMAGE RECONSTRUCTION USING LARGE ASTRONOMICAL TELESCOPES Final Report, 1 Mar. 1977 - 28 Feb. 1978
Peter A. Strittmatter and Neville J. Woolf 14 Apr. 1978 24 p refs
(Contract F19628-77-C-0063)
(AD-A058103; AFGL-TR-78-0167) Avail: NTIS HC A02/MF A01 CSCL 03/1

A camera, suitable for recording speckle interferograms through large optical telescopes, has been constructed. Its design and performance characteristics are reported together with the results of initial studies of the isoplanatic patch at the Steward Observatory 2.3 m telescope on Kitt Peak. The speckle pattern correlation approaches zero for objects separated by 6 arcsecs. Author (GRA)

N79-12516# Netherlands Foundation for Radio Astronomy, Dwingelo. Radiosterrenwacht.
VERY-LONG-BASELINE-INTERFEROMETRY IN GEOPHYSICS, GEODESY AND ASTRONOMY
R. T. Schilizzi and J. Campbell (Bonn Univ.) *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 329-337 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12517# Astronomische Rechen-Institut, Heidelberg (West Germany).
ZERO-POINT DETERMINATION OF THE REFERENCE SYSTEM BY RADIO INTERFEROMETRY
H. G. Walter *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 339-340 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12518# Sternwarte Bonn (West Germany).
ASTROMETRIC EXPECTATIONS
P. Brosche *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 341-342 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N79-12982 Arizona Univ., Tucson.
DEVELOPMENT OF AN EXPERIMENTAL INVESTIGATION OF SOME THEORIES OF RELATIVITY BY DAYTIME ASTROMETRY Ph.D. Thesis
Paul Thomas Ballard 1978 123 p
Avail: Univ. Microfilms Order No. 7820399

An experiment to observe planet-sun separations through conjunction in full daylight is described. The nature of the experiment as well as some details of the experimental apparatus are presented. Detailed calculations are presented which address the rather general problem of phase sensitive detection of a shot noise limited signal. The apparent oscillations of the solar diameter, a length reference in the field of the telescope, and the interferometric reduction of unwanted background radiation are included. A preliminary analysis of the intended observations is presented illustrating the sensitivity of the observations to various effects of gravitational importance. Dissert. Abstr.

N79-12983 Brandeis Univ., Waltham, Mass.
THE EVOLUTION OF CONFINED, TWO COMPONENT, SELF-GRAVITATING SPHERES Ph.D. Thesis
Andrew John Mazzella, Jr. 1978 90 p
Avail: Univ. Microfilms Order No. 7819948

The fluid-dynamical method for Larson is extended to the case of two (or more) populations, using a complete representation of the field star distribution in deriving the Fokker-Planck relaxation terms. This method is applied to the special case of a confined, isolated system of stars containing only two distinct populations, with the intent of providing further data toward validating the quantitative aspects of the method and also of isolating and investigating certain of the dynamical effects which contribute to the evolution of stellar systems. The results of the evolution of a number of models are verified that the principal branch of the locus of isothermal configurations is stable, and that an instability exists for systems below the critical energy. Dissert. Abstr.

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N79-12984* National Aeronautics and Space Administration, Washington, D. C.
THE MARTIAN LANDSCAPE
1978 160 p Original contains color illustrations
(NASA-SP-425; LC-78-606041) Avail: HC SOD $12.00 CSCL 03B

A first person, anecdotal account of preparations for photographing the Martian surface is related by the leader of NASA's Lander Imaging Science TRe Team. Particular attention is given to the design of the facsimile camera. Image sequencing, picture calibration, reconstruction of color, and the search for motion on Mars are discussed. Over 200 color and black and white photographs taken by both landers are included along with a table showing the camera settings used. A stereopticon is included for viewing 19 stereopairs in three dimension. A.R.H.

N79-12985 Texas Univ. at Dallas.
NEAR-SURFACE PHYSICAL PROPERTIES OF THE EARTH AND MOON Ph.D. Thesis
Douglas Martin Johnson 1978 194 p
Avail: Univ. Microfilms Order No. 7824327

The seismic velocities of lunar soils were measured in a simulated lunar environment. The velocities ranged from

125 m/sec to 550 m/sec, are stress sensitive, and depend on soil compaction history. The origin of the 4 meter to 12 meter deep velocity interface observed in the lunar regolith at all Apollo landing sites is discussed. The fluid permeability of ocean basalts was measured and a slight depth permeability relationship was observed, showing a decrease in permeability with depth. Crack distributions in the upper portion of the oceanic crust were determined from visual observation of the cracks in drill cores and synthetic seismograms were computed from the profiles of crack number with depth. The effect of the cracks on seismic velocity, structure, and fluid circulation is examined. The results of crack analyses of two deep penetration drill holes in the oceanic crust are discussed. Dissert. Abstr.

N79-12986*# Lunar and Planetary Inst., Houston, Tex.
PAPERS PRESENTED TO THE CONFERENCE ON ORIGINS OF PLANETARY MAGNETISM
1978 142 p refs Conf. held at Houston, Tex., 8-11 Nov. 1978
(Contract NSR-09-051-001)
(NASA-CR-157825; LPI-Contrib-348; LC-79-189790) Avail: NTIS HC A07/MF A01 CSCL 03B

Abstracts of 63 papers accepted for publication are presented. Topics cover geomagnetism in the context of planetary magnetism, lunar magnetism, the dynamo theory and nondynamo processes, comparative planetary magnetism (terrestrial and outer planets), meteoritic magnetism, and the early solar magnetic field. Author and subject indexes are provided. A.R.H.

N79-12987*# Texas A&M Univ., College Station. Dept. of Geophysics.
A COMPARISON OF TWO TYPES OF VELOCITY MODELS FOR THE LUNAR CRUST: SMOOTH CONTINUOUS AND STEPWISE LAYERED Final Report, 1 Feb. 1976 - 15 Mar. 1978
Anthony F. Gangi 1 Nov. 1978 59 p refs
(Grant NsG-7189)
(NASA-CR-157830) Avail: NTIS HC A04/MF A01 CSCL 03B

The data from the Apollo-14 and Apollo-16 Active Seismic Experiments were reanalyzed and show that a power-law velocity variation with depth is consistent with both the traveltimes and amplitudes of the first arrivals for source-to-geophone separations up to 32m. The data were improved by removing spurious glithches, flickering and stacking. While this improved the signal-to-noise ratios, it was not possible to measure the arrivals beyond 32m. The physical evidence that the shallow lunar regolith is made up of fine particles adds weight to the 1/6-power velocity model. The 1/6-power law predicts the traveltime t(x), varies with separation, x, as t(x) = t sub 0 (x/x sub 0) to the 5/6 power and, using a first-order theory, the amplitude, A(x), varies as A(x) = A sub 0 (x/x sub 0) to the (13-m)/12, M >1; the layer-velocity model predicts t(x) = t sub 0 (x/xsub 0) and A(x) = A sub 0 (x/x sub 0) to the 2nd power. Author

N79-12502# Uppsala Univ. (Sweden). Dept. of Solid Earth Physics.
THE MEASUREMENT OF LUNAR PALAEOTIDES AND THEIR IMPLICATION TO THE ORIGIN OF THE EARTH-MOON SYSTEM
A. J. Anderson *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 219-222 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

N79-12506# Meteorological Office, Bracknell (England). Geophysical Fluid Dynamics Lab.
HOW TO LOCATE THE ELECTRICALLY-CONDUCTING FLUID CORE OF A PLANET FROM EXTERNAL MAGNETIC OBSERVATIONS
R. Hide *In* ESA Space Oceanog., Navigation, and Geodyn. Apr. 1978 p 247-248 refs (For primary document see N79-12482 03-42)
Avail: NTIS HC A16/MF A01

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N79-12988 California Univ., Los Angeles.
APOLLO 15 AND 16 SUBSATELLITE MAGNETOMETER MEASUREMENTS OF SOLAR WIND AND MAGNETOSPHERIC PLASMA INTERACTIONS WITH THE MOON Ph.D. Thesis
Bernard Robert Lichtenstein 1978 362 p
Avail: Univ. Microfilms Order No. 7820248

Pre-Apollo 15 measurements and theoretical analyses are reviewed and Apollo 15 and 16 subsatellite magnetometer results based on vector data obtained at a 24-second sample period, or 24-second averages of higher sample rate data are examined. An average over all of the Apollo 15 subsatellite magnetometer data obtained while the Moon was in the solar wind revealed that the perturbations of the interplanetary magnetic field magnitude were qualitatively similar to those observed by Explorer 35 magnetometers at much higher altitudes. The average magnetic effects of the magnetosheath plasma flow interaction with the Moon was qualitatively similar to the solar wind. An average increase in field magnitude in the day quadrant for measurements made when the Moon was in the plasma sheet suggests that the average flow direction at lunar distances is sunward. Dissert. Abstr.

N79-12989 Colorado Univ., Boulder.
ELEMENTAL COMPOSITION AND IONIZATION STATE OF THE SOLAR ATMOSPHERE AND SOLAR WIND Ph.D. Thesis
Jo Ann Cram Joselyn 1978 160 p
Avail: Univ. Microfilms Order No. 7820526

Theories of the formation of the solar system are tested by their ability to explain observed abundances, and, elemental abundances can serve as tracers, helping to determine the origin and transport of ions. The theoretical consequences of rapidly diverging flow geometries on the elemental composition of the solar wind, a steady three-fluid model of the solar coronal expansion, is developed for non-spherically symmetric flow geometries of the general sort thought to be characteristic of coronal holes. The validity of ionization equilibrium in the presence of flow, the system of steady mass conservation equations is solved for the ionization stages of carbon under the range of conditions appropriate to the transition region of the sun. The results for carbon for the transition region show that ionization equilibrium can be reasonably valid for some ions but invalid for others, which implies that solar emission spectra and solar wind data could be seriously misinterpreted. Dissert. Abstr.

N79-12990*# National Aeronautics and Space Administration, Washington, D. C.
EFFECTS OF LONG-PERIOD SOLAR ACTIVITY FLUCTUATION ON TEMPERATURE AND PRESSURE OF THE TERRESTRIAL ATMOSPHERE
B. M. Rubashev Nov. 1978 25 p refs Transl. into ENGLISH from the book "Solnechno-Atmosfernyye Svyazi v Teorii Klimata i Prognozakh Pogody" Leningrad, Gidrometeoizdat, 1974 p 43-55 Original language document was announced as A74-37678 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-75345) Avail: NTIS HC A03/MF A01 CSCL 03B

The present state of research on the influence of solar sunspot activity on tropospheric temperature and pressure is reviewed. The existence of an 11-year temperature cycle of 5 different types is affirmed. A cyclic change in atmospheric pressure, deducing characteristic changes between 11-year cycles is discussed. The existence of 80-year and 5-to-6-year cycles of temperature is established, and physical causes for birth are suggested. S.E.S.

N79-12991# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NO. 406, JUNE 1978. PART 1: PROMPT REPORTS. DATA FOR MAY 1978.

APRIL 1978
Helen E. Coffey Jun. 1978 173 p 2 Vol.
(PB-285773/8; SGD-406-Pt-1; NOAA-78072502-Pt-1) Avail: NTIS HC A08/MF A01 CSCL 03A

Data is provided for May 1978 on: alert period, daily solar indices, solar flares, solar radio waves, solar X-ray radiation, coronal holes, inferred IP Magnetic field polarities, mean solar magnetic field, solar wind measurements, geomagnetic substorms, magnetograms of geomagnetic storm 30 April - 4 May, and energetic solar particles. It also provides data for April 1978 on: daily solar activity center, sudden ionospheric disturbances, solar X-ray radiation, solar radio waves, cosmic rays, geomagnetic indices, and radio propagation. GRA

N79-12992# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NO. 406, JUNE 1978. PART 2: COMPREHENSIVE REPORTS. DATA FOR DECEMBER 1977 - NOVEMBER 1977 AND MISCELLANEA
Helen E. Coffey Jun. 1978 87 p 2 Vol.
(PB-285774/6; SGD-406-Pt-2; NOAA-78072503-Pt-2) Avail: NTIS HC A05/MF A01 CSCL 03A

A comprehensive report for December 1977, November 1977 and Miscellaneous data provides data on: active regions, synoptic solar maps, solar flares, solar radio waves, energetic solar particles and plasma, synoptic chart, abbreviated calendar record, regional flare index, geomagnetic indices, cosmic rays, and GMS/SEM data for September 1977 event. GRA

93 SPACE RADIATION

Includes cosmic radiation and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N79-12993 Illinois Univ. at Urbana-Champaign, Urbana.
X AND UV RADIATION FROM ACCRETING NON-MAGNETIC DEGENERATE DWARFS Ph.D. Thesis
Nikolaos Dimitrios Kylafis 1978 195 p
Avail: Univ. Microfilms Order No. 7820984

Numerical calculations performed on accretion rates and stellar masses are presented. Results show: (1) stars undergoing spherical accretion can produce a maximum hard X-ray luminosity which is a factor of four larger than expected, (2) even high mass stars can produce low temperature X-ray spectra, (3) spectral temperature varies dramatically and stars exhibit a pronounced correlation between X-ray spectral temperature and luminosity, (4) at moderate and high accretion rates, the spectra have a power law high energy tail, (5) all spectra show an intense UV of soft X-ray blackbody component whose importance increases relative to the hard X-ray component as the accretion rate increases, (6) inclusion of photoabsorption does not quantitatively alter the Eddington luminosity, and (7) at high accretion rates, absorption can produce a substantial low-energy cutoff in the hard X-ray spectrum. Dissert. Abstr.

N79-12994 New Hampshire Univ., Durham.
A NEW AND PRECISE CONSTRUCTION OF THE LOCAL INTERSTELLAR ELECTRON SPECTRUM FROM THE RADIO BACKGROUND AND AN APPLICATION TO THE SOLAR MODULATION OF COSMIC RAYS SHOWING AN INCOMPATIBILITY OF THE ELECTRON AND NUCLEI MODULATION USING THE SPHERICALLY SYMMETRIC FOKKER-PLANCK EQUATION Ph.D. Thesis
John Michael Rockstroh 1977 174 p
Avail: Univ. Microfilms Order No. 7820460

An interstellar electron spectrum was determined independently of solar modulation and provides an estimate of the absolute depth of electron modulation. Measured electron, proton and helium-nuclei fluxes are compared to predictions of the spherically symmetric Fokker-Planck equation using electron modulation as a base. Non-tracking of modulation parameters during the recent recovery that did not occur during the 1965-69 period were observed. Modulation reluctance of the cosmic-ray electrons is discussed and compared with and distinguished from the hysteresis effects that were also discovered during the recent recovery. Possible explanations for the differences in the relative tracking of the electron and nuclei modulation parameters observed between 1965-69 period and the 1969-74 recovery period are discussed. Dissert. Abstr.

N79-12995 California Univ., Riverside.
ENERGY AND ANGLE DISTRIBUTIONS FOR ATMOSPHERIC AND COSMIC DIFFUSE GAMMA RAYS FROM 2 TO 25 MeV Ph.D. Thesis
James Michael Ryan 1978 135 p
Avail: Univ. Microfilms Order No. 7821365

A double Compton scatter gamma ray telescope flown on a balloon to 3.0 g/sq cm residual atmosphere was used to measure angle and energy distributions for gamma rays near the top and deep within the atmosphere for energies of 2 MeV to 25 MeV and zenith angles of 0 deg to 50 deg (downward moving) and 130 deg to 180 deg (upward moving) and the cosmic diffuse flux of gamma fays for energies from 2 MeV to 25 MeV. Growth curves from 3.4 to 100 g/sq cm of residual atmosphere are used to determine the downward moving atmospheric fluxes above the Pfotzer maximum. Results are given for six energy intervals and for five angle intervals. Dissert. Abstr.

N79-12996 Colorado Univ. at Boulder.
ENERGETIC PROTON FLUXES AND MAGNETIC FIELD ORIENTATION IN THE QUIET TAIL MAGNETOSHEATH Ph.D. Thesis
Terry Gene Forbes 1978 173 p
Avail: Univ. Microfilms Order No. 7820507

Quiet time magnetosheath data from the Energetic Particle Experiment (EPE) on Explorer 47 reveals the occurrence of detailed correlations between the magnetic field orientation and proton flux above 52 kev. A Compton-Getting analysis of combined EPE, bulk flow, and magnetometer data shows that the correlation is caused by a variation in the differential intensity at 52 kev, and a flow of energetic protons along magnetic field lines. The computed flow velocities along the magnetic field are 2.0 to 4.1 times greater than the component of the low energy convective magnetosheath flow along the magnetic field. Dissert. Abstr.

99 GENERAL

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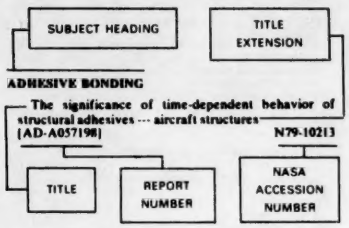

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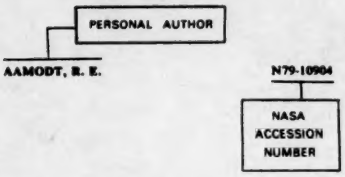

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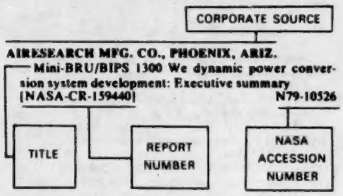

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Oscillations of a liquid in a rotating cylinder. Part 1: Solid-body rotation
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ARMY AVIATION ENGINEERING FLIGHT ACTIVITY, EDWARDS AFB, CALIF.
AH-1G helicopter main rotor flow survey
[AD-A057443] N79-12078
ARMY AVIATION RESEARCH AND DEVELOPMENT COMMAND, MOFFETT FIELD, CALIF.
Comprehensive helicopter analysis: A state of the art review
[NASA-TM-78539] N79-12019
ARMY AVIATION RESEARCH AND DEVELOPMENT COMMAND, ST. LOUIS, MO.
Wear of seal materials used in aircraft propulsion systems
[NASA-TM-79003] N79-12204
ARMY AVIATION SYSTEMS COMMAND, ST. LOUIS, MO.
Proceedings of the Technical Conference on the Effects of Helicopter Downwash on Free Projectiles
[AD-A058123] N79-12067
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The department of Defense's alternate energy policy
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ATACS equipments. Interoperation, block diagrams and abbreviated descriptions
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Potential uses of fiber optics in Army fixed facilities
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The 19302A GSRS, Missile number V-9, round V-9 [20 April 1978]
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ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MISS.
Literature review-elastic constants for airport pavement materials
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Effects of extensional flow on polystyrene in dilute solutions
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ARMY MOBILITY EQUIPMENT RESEARCH AND DEVELOPMENT COMMAND, FORT BELVOIR, VA.
Test and evaluation of the Cravens Wanlass modification for selected single phase fractional horsepower motors
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Tests to determine the ullage explosion tolerance of helicopter fuel tanks
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ARMY TANK-AUTOMOTIVE RESEARCH AND DEVELOPMENT COMMAND, WARREN, MICH.
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Vertical structure in atmospheric fog and haze and its effects on IR extinction
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The 19302A GSRS. Missile numbers V-7/V-8, round numbers V-7/V-8
[AD-A058159] N79-12659
The 17901A Honest John, missile numbers 197 [AD], 217 [AK], and 241 [BC], round numbers unknown [23 May 1978]
[AD-A058234] N79-12662
ATOMIC ENERGY RESEARCH ESTABLISHMENT, HARWELL (ENGLAND).
Carbon fibre study no. 5: An investigation into the hydrothermal degradation of carbon fibre composites
[BAE-TP-7679] N79-12162
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[BAE-TP-7678] N79-12163
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Microstructural stability of 21-6-9 stainless steel
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Multiple-satellite studies of magnetospheric substorms: Plasma sheet recovery and the poleward leap of auroral-zone activity
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Design charts and boundaries for identifying departure resistant fighter configurations
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Information requirements of the National Aeronautics and Space Administration's safety, environmental health, and occupational medicine programs
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Integration of air cushion landing system technology into the JINDIVIK remotely piloted vehicle
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B-52B-008/DTV [Drop Test Vehicle] configuration 1 [with and without fins] flight test results - captive flight and drop test missions
[NASA-CR-150855] N79-12065
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Development of aircraft lavatory compartments with improved fire resistance characteristics, phase I: Fire containment test of a wide body aircraft lavatory module
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BOEING MILITARY AIRPLANE DEVELOPMENT, SEATTLE, WASH.
Airplane responsive engine selection [ARES]. Volume 1: ARES user guide
[AD-A057392] N79-12090
BOLT, BERANEK, AND NEWMAN, INC., CANOGA PARK, CALIF.
Evaluation of aero Commander propeller acoustic data: Static operations
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Preliminary power train design for a state-of-the-art electric vehicle [executive summary]
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Carbon fibre study no. 5: An investigation into the hydrothermal degradation of carbon fibre composites
[BAE-TP-7679] N79-12162
Carbon fibre study no. 4: Failure criteria of CFRP composites at cryogenic temperatures
[BAE-TP-7678] N79-12163
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CARNEGIE-MELLON INST. OF RESEARCH, PITTSBURGH, PA.
Evaluation of the mechanical properties of electroslag refined Fe-12Ni alloys
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An integrated theory of information transfer
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An analytic solution for the enrichment of uranium hexafluoride in long countercurrent centrifuges
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CENTER FOR NAVAL ANALYSES, ARLINGTON, VA.
Assessment of selected lighter-than-air vehicles for mission tasks of the US Coast Guard
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CENTRE NATIONAL D'ETUDES SPATIALES, TOULOUSE [FRANCE].
Satellite geodesy and navigation. Proposal for a European programme
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Executive and Tabular summary of air bag field experience, volume 2, number 1
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CHICAGO UNIV., ILL.
A kinematic investigation of the influence of anvil air flow over convective nephsystems on high-level horizontal flow
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CIVIL AEROMEDICAL INST., OKLAHOMA CITY, OKLA.
The morbidity experience of air traffic control personnel, 1967-1977
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Applications of two-parameter decision theories in psychology [AD-A059010] N79-12705

COLUMBIA UNIV. TEACHERS COLL., NEW YORK.
The effect of measurement error on the power of some statistical tests under linear statistical models
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COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, ASPENDALE [AUSTRALIA].
An airborne X-band microwave radiometer [ISBN-0-643-00314-2] N79-12410

COMMUNICATIONS RESEARCH CENTRE, OTTAWA [ONTARIO].
Hermes DAMA experiment [CRC-1309] N79-12269
Canadian aeronautical satellite tests using the ATS-6 satellite, January 1976 [CRC-TN-693] N79-12270

COMPUTER SCIENCES CORP., FALLS CHURCH, VA.
Maritime satellite communications: A management perspective [PB-283698/9] N79-12316

CONSERVATION FOUNDATION, WASHINGTON, D. C.
Physical management of coastal floodplains: Guidelines for hazards and ecosystems management [PB-284164/1] N79-12534

CONTINENTAL SHELF INST., TRONDHEIM [NORWAY].
Future European contributions to space technology and the exploration of the Norwegian continental shelf
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CONTROL TECHNOLOGY ASSOCIATES, CUPERTINO, CALIF.
Laboratory demonstration of aircraft estimation using low-cost sensors [NASA-CR-152049] N79-12417

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The application of air cushion configurations to icebreaking [PB-284011/4] N79-12538

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Effect of bottom topography on stability and wave propagation in a Kelvin-Helmholtz flow
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DEPARTMENT OF ENERGY, OAK RIDGE, TENN.
Energy information data base: Serial titles [TID-4579-R10] N79-12566

DEPARTMENT OF ENERGY, WASHINGTON, D. C.
National photovoltaic program plan [DOE/ET-0035[78]] N79-12567
Environmental Development Plan [EDP]: Photovoltaics, 1977 [DOE/EDP-0003] N79-12569
Silicon Schottky photovoltaic diodes for solar energy conversion [PB-283998/3] N79-12572

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Spacelab experiments with atomic clocks
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DEVELOPMENT SCIENCES, INC., CITY OF INDUSTRY, CALIF.
A concept study of a remotely piloted vehicle for Mars exploration [NASA-CR-157942] N79-12128

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La Recherche Aerospatiale. Bi-monthly Bulletin No. 1978-1 [ESA-TT-491] N79-11996
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Water resources data for Ohio, water year 1977. Volume 2: St. Lawrence River Basin
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Geohydrologic evaluation of a landfill in a coastal area, St. Petersburg, Florida
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. NATIONAL SPACE TECHNOLOGY LABS., BAY SAINT LOUIS, MISS.

Experimental model for technology applications and transfer: An analysis. Technology Application Consortium
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. PASADENA OFFICE, CALIF.

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NATIONAL CLIMATIC CENTER, ASHEVILLE, N. C.

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NATIONAL COMMISSION ON NEW TECHNOLOGICAL USES OF COPYRIGHTED WORKS, WASHINGTON, D. C.

Transcript of National Commission on New Technological Uses of Copyrighted Works Meeting no. 20
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NATIONAL ENVIRONMENTAL SATELLITE CENTER, WASHINGTON, D. C.

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NATIONAL ENVIRONMENTAL SATELLITE SERVICE, WASHINGTON, D. C.

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NATIONAL GEOPHYSICAL AND SOLAR-TERRESTRIAL DATA CENTER, BOULDER, COLO.

Solar-geophysical data no. 406, June 1978. Part 1: Prompt reports. Data for May 1978, April 1978
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Solar-geophysical data no. 406, June 1978. Part 2: Comprehensive reports. Data for December 1977 - November 1977 and miscellanea
[PB-285774/6] N79-12992

NATIONAL HURRICANE AND EXPERIMENTAL METEOROLOGY LAB., CORAL GABLES, FLA.

The distribution of turbulent kinetic energy dissipation in hurricanes over a limited range of wind speeds
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Atlantic tropical cyclone tracks by 5-, 10-, 15-, and 30-day periods
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A tropical cyclone data tape for the North Atlantic basin, 1886-1977: Contents, limitations, and uses
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, COLO.

Photodissociation rates for minor species in the earth's atmosphere
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, WASHINGTON, D. C.

The federal plan for meteorological services and supporting research, fiscal year 1979
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NATIONAL SEVERE STORMS LAB., NORMAN, OKLA.

Spring program summary [1977]
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NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VA.

Electrochemical methods of chemical analysis, volume 2. A bibliography with abstracts
[NTIS/PS-78/0966/8] N79-12188
Titanium and titanium alloy creep. A bibliography with abstracts
[NTIS/PS-78/0970/0] N79-12214
Investment casting. Citations from the engineering index data base
[NTIS/PS-78/0982/5] N79-12257
Fire extinguishing agents. Citations from the engineering index data base
[NTIS/PS-78/0988/2] N79-12258
Antenna side lobe and interference reduction. A bibliography with abstracts
[NTIS/PS-78/0983/3] N79-12314
Speech intelligibility. A bibliography with abstracts
[NTIS/PS-78/0980/9] N79-12315
Ion selective electrodes. Citations from the NTIS data base
[NTIS/PS-78/0964/3] N79-12349
Ion selective electrodes. Citations from the engineering index data base
[NTIS/PS-78/0965/0] N79-12350
Laser welding. Citations from the Engineering Index data base
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Atmospheric effects on laser beams, volume 2. A bibliography with abstracts
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Remote sensing of agricultural resources. A bibliography with abstracts
[NTIS/PS-78/0969/2] N79-12536
Nitrogen oxide air pollution. Volume 2, part 1: Control technology. A bibliography with abstracts
[NTIS/PS-78/0971/8] N79-12591
Nitrogen oxide air pollution. Volume 2, part 2: Detection and analysis. A bibliography with abstracts
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Nitrogen oxide air pollution. Part 3: Atmospheric chemistry. A bibliography with abstracts
[NTIS/PS-78/0973/4] N79-12593
Nitrogen oxide air pollution. Part 4: Biological effects. A bibliography with abstracts
[NTIS/PS-78/0974/2] N79-12594

Nitrogen oxide air pollution. Volume 2 Part 5: Emissions studies. A bibliography with abstracts
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Control theory, volume 3. A bibliography with abstracts
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Applications of the Fast Fourier Transform, volume 1. A bibliography with abstracts
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Applications of the Fast Fourier Transform, volume 2. A bibliography with abstracts
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Integration of partial differential equations. A bibliography with abstracts
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Electron beam fusion. A bibliography with abstracts
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Management by objectives. A bibliography with abstracts
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On-line information retrieval systems, volume 1. bibliography with abstracts
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NATIONAL WEATHER SERVICE, SALT LAKE CITY, UTAH.
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NATIONAL WEATHER SERVICE, SILVER SPRING, MD.
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NORTH CAROLINA STATE UNIV., RALEIGH.
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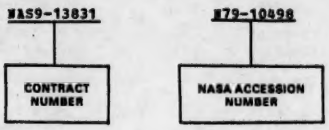

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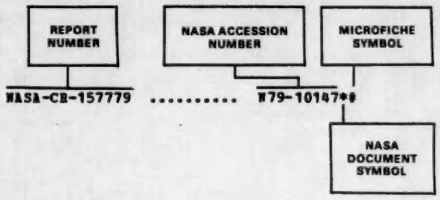

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